A STUDY OF DIET IN MESOPOTAMIA (c.3000 - 600 BC) AND ASSOCIATED AGRICULTURAL TECHNIQUES AND METHODS OF FOOD PREPARATION

by

Elizabeth Rosemary Ellison

Institute of Archaeology

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APPENDIX I

Capacity Measures

In ancient Mesopotamia foodstuffs, grain yields etc., were expressed in capacity measures and some understanding of these measures is essential before the nutritional value of the food eaten and the efficiency of the agricultural techniques used can be considered. The basic measure which was used from the third to the first millennium is the SÌLA/qa, numbers of which form larger measures that vary from place to place and period to period. Thus, in Assyria, the imēru (homer) is made up of 100 qa; in Babylonia, the GUR/kurru equals 300 SÌLA/qa (180 SÌLA in the Neo-Babylonian period); in Mari (at the beginning of the second millennium) the GUR equals 120 SÌLA; in the Sargonic period the GUR.SAG.GÀL is made up of 240 SÌLA and in the pre-Sargonic period the GUR.SAG.GÀL equals 144 SÌLA. These larger measures (imēru, GUR/kurru, GUR.SAG.GÀL etc.,) are also subdivided into units such as the PI/pānu and the BÁN/sūtu, which again contain varying numbers of SÌLAS.[1] This list of measures is a simplification as, especially in the earlier periods, there were other GURS (for example the GUR.SA.DÙG with 140 SÌLA and the GUR.A-ga-de.KI with 300 SÌLA) consisting of different numbers of SÌLAS. The sūtu too could be made up of different numbers of SÌLAS (for example the sūtu of Carcemish and the bronze sūtu and the sūtu of 9 or 8 SÌLA in the Neo Assyrian period.[2]) However the measures listed are those used most frequently in connection with foodstuffs and agriculture and are the main ones used in this study. These measures apply mainly to solids and liquids were sometimes recorded in other terms.

Although it is possible to draw up lists of, say, the yields in SÌLAS of fields in different areas and different periods, no proper comparison can be made until the size of the SÌLA used can be established and preferably in terms of a modern equivalent. In other words 1) has the SÌLA the same capacity throughout the third to the first millennium, and 2) how does that capacity relate to the modern litre?

There are two possible ways of approaching these questions. It has been suggested that the ubiquitous bevel-rim bowls of the Uruk period may have been used to measure out the rations issued to employees in households.[3] If this was so there should be a standard size or sizes among these bowls, and, given the

continuation of the ration-system, it is possible that there were similar standard sizes in pottery from later periods. Second, a few pottery vessels are inscribed with a capacity measure so that if the cubic capacity of the vessel is related to the inscription some idea can be gained of the size of the SÌLA at that time. In addition there are some mathematical texts which have made it possible for calculations to be carried out on the size of the SÌLA.

Cubic capacity of pottery

In order to calculate the cubic-capacity of pottery the published drawings from a number of sites have been studied. Of necessity this has been rather a rough and ready method as the drawings tend to be of pottery types rather than of specific pots so that slight variations of size from one vessel to another may have been ironed out. When the cubic-capacity is worked out, the pots have been divided into size-groups and the average for each group was taken. This has been done for all types of pottery examined, and again for open-bowls.[4]

The average sizes of the pottery suggested that if they were based on a standard measure, that measure stayed more or less the same throughout the period. Most variations, for example .6 litre open-bowl at Nippur in the Old Babylonian period, are generally caused by the smaller number of vessels falling into that range, and because of this cannot be taken as indicating a change in the standard measure. (see Table 19, pp.3-5).

Inscribed vessels & mathematical calculations

A vase of Entemena, dating to the Early Dynastic period, held a NIGIN according to an inscription. The entire capacity of the vase was calculated to be 4.71 litres, including the neck. The capacity without the neck was 4.15 litres. As a NIGIN= 10 SÌLA, the capacity of the SÌLA equals .471 litre, including the neck, and .415 without the neck.[6]

A broken vessel from Nippur (dating to the Ur III period) contained 175 and 5/6 SÌLAS, according to an inscription on it. The partial outline of this vessel is published and if the complete outline is reconstructed the cubic capacity (excluding the neck) is 178.7 litres. Thus the SÌLA would appear to equal 1.016 litres.[7]

An inscription on a pot fragment from Rimah (Old Babylonian period) suggests that the SÌLA there may have been about .8 litres.[8]

TABLE 19: Cubic capacity of pottery

a) ALL POTS

Size	Early Dynastic		Akkadian		Ur III		Isin/Larsa		Old Babylonian		Kassite/ 2nd mill.		Neo-Assyrian/ Neo-Babylonian		Site
	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	
.12-.37	-	-	2	.22	16	.21	9	.237	9	.22	7	.25	7	.16	Nippur
	-	-	3	.196	-	-	-	-	-	-	63	.229	-	-	Nuzi
	35	.23	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	8	.22	24	.22	11	.23	6	.25	16	.24	-	-	-	-	Asmar
	-	-	-	-	-	-	-	-	10	.27	-	-	-	-	Ischali
	12	.26	-	-	-	-	-	-	-	-	15	.32	-	-	Ur
	2	.19	-	-	16	.22	-	-	-	-	-	-	-	-	Tello
	-	-	-	-	-	-	-	-	-	-	-	-	10	.23	Nimrud
		.225		.21		.22		.24		.24		.266		.195	AVERAGE
.38-.62	-	-	2	.49	5	.52	3	.5	6	.46	2	.51	4	.5	Nippur
	-	-	1	.54	-	-	-	-	-	-	19	.5	-	-	Nuzi
	12	.5	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	5	.46	3	.56	-	-	-	-	4	.45	-	-	-	-	Asmar
	-	-	-	-	-	-	-	-	2	.55	-	-	-	-	Ischali
	9	.476	-	-	-	-	-	-	-	-	15	.48	-	-	Ur
	2	.6	-	-	4	.48	-	-	-	-	-	-	-	-	Tello
	-	-	-	-	-	-	-	-	-	-	-	-	8	.5	Nimrud
		.5		.54		.5		.5		.486		.496		.5	AVERAGE
.63-.87	-	-	1	.69	7	.72	-	-	-	-	1	.7	7	.74	Nippur
	-	-	-	-	-	-	-	-	-	-	10	.7	-	-	Nuzi
	6	.75	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	2	.77	3	.76	-	-	-	-	1	.67	-	-	-	-	Asmar
	-	-	-	-	-	-	-	-	2	.76	-	-	-	-	Ischali
	5	.79	-	-	-	-	-	-	-	-	5	.69	-	-	Ur
	-	-	-	-	6	.78	-	-	-	-	-	-	-	-	Tello
	-	-	-	-	-	-	-	-	-	-	-	-	8	.72	Nimrud
		.77		.725		.75		-		.715		.696		.73	AVERAGE

TABLE 19 cont.

Size	Early Dynastic		Akkadian		Ur III		Isin/Larsa		Old Babylonian		Kassite 2nd mill.		Neo-Assyrian/ Neo-Babylonian		Site
	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	
.88-1.12	-	-	1	1.03	6	.968	1	1.0	4	.92	3	.94	2	.92	Nippur
	-	-	-	-	-	-	-	-	-	-	10	1.0	-	-	Nuzi
	2	.88	1	.99	-	-	-	-	-	-	-	-	-	-	Khafajeh
	-	-	-	-	-	-	-	-	1	.9	-	-	-	-	Asmar
	14	.99	-	-	-	-	-	-	-	-	4	.99	-	-	Ur
	-	-	-	-	1	1.1	-	-	-	-	-	-	-	-	Tello
	-	-	-	-	-	-	-	-	-	-	-	-	3	.94	Nimrud
		.935		1.01		1.03		1.0		.91		.976		.93	AVERAGE
b) OPEN BOWLS															
.12-.37	-	-	2	.22	7	.2	6	.246	4	.21	2	.225	2	.2	Nippur
	-	-	2	.2	-	-	-	-	-	-	26	.2	-	-	Nuzi
	8	.25	-	-		-	-	-	-	-	-	-	-	-	Khafajeh
	3	.22	5	.19	3	.24	4	.25	-	-	-	-	-	-	Asmar
	-	-	-	-	-	-	-	-	-	-	8	.215	-	-	Ur
	-	-	-	-	3	.31	-	-	-	-	-	-	-	-	Tello
	-	-	-	-	-	-	-	-	-	-	-	-	7	.23	Nimrud
		.235		.2		.25		.248		.21		.213		.215	AVERAGE
.38-.62	-	-	1	.56	2	.51	1	.6	1	.6	-	-	4	.5	Nippur
	-	-	1	.54	-	-	-	-	-	-	6	.53	-	-	Nuzi
	1	.45	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	1	.54	-	-	-	-	-	-	-	-	-	-	-	-	Asmar
	3	.48	-	-	-	-	-	-	-	-	8	.5	-	-	Ur
	1	.6	-	-	1	.55	-	-	-	-	-	-	-	-	Tello
	-	-	-	-	-	-	-	-	-	-	-	-	7	.51	Nimrud
		.519		.55		.53		.6		.6		.515		.5	AVERAGE

TABLE 19 cont.

Size	Early Dynastic		Akkadian		Ur III		Isin/Larsa		Old Babylonian		Kassite 2nd mill.		Neo-Assyrian/ Neo-Babylonian		Site
	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	Nos. egs.	Av.	
.38-.62	-	-	1	.56	2	.51	1	.6	1	.6	-	-	4	.5	Nippur
	-	-	1	.54	-	-	-	-	-	-	6	.53	-	-	Nuzi
	1	.45	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	1	.54	-	-	-	-	-	-	-	-	-	-	-	-	Asmar
	3	.46	-	-	-	-	-	-	-	-	8	.5	-	-	Ur
	1	.6	-	-	1	.55	-	-	-	-	-	-	-	-	Tell Nimrud
	-	-	-	-	-	-	-	-	-	-	-	-	7	.51	
		.519		.55		.53		.6		.6		.515		.5	AVERAGE
.63-.87	-	-	1	.69	2	.74	-	-	-	-	1	.7	1	.77	Nippur
	-	-	-	-	-	-	-	-	-	-	7	.68	-	-	Nuzi
	2	.8	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	-	-	-	-	-	-	-	-	-	-	-	-	3	.7	Nimrud
		.8		.69		.74		-		-		.69		.735	AVERAGE
.88-1.12	-	-	-	-	1	.92	-	-	-	-			2	.92	Nimrud
	-	-	-	-	-	-	-	-	-	-	6	.975	-	-	Nuzi
	1	.88	-	-	-	-	-	-	-	-	-	-	-	-	Khafajeh
	3	.96	-	-	-	-	-	-	-	-	-	-	-	-	Ur
	-	-	-	-	-	-	-	-	-	-	-	-	3	.94	Nimrud
		.92		-		.92		-		-		.975		.93	AVERAGE

c) Bevelled-rim bowls

.12-.37	.38-.62	.63-.87	.88-1.12	1.14-2.00	above 2.00	Site
-	-	-	.93	-	-	Tello
-	-	.8	-	-	-	Khafejeh
-	.5?	-	.989	-	-	Nuzi
-	-	-	-	1.2	-	Warka
-	.44	-	-	-	-	Tell Brak
-	-	.8	-	-	-	Jemdet Nasr
.3	-	-	-	1.8	4.5	Godin V
.3	.47	.8	.959	1.5	4.5	AVERAGE

An inscription on a vessel from Nimrud (Neo-Assyrian period) suggests the vessel contained 137 SÌLA (1 ANŠE 3 BÁN 7 SÌLA). When the cubic capity (excluding the neck) of this vessel is calculated the SÌLA appears to be 1.88 litres.[9]

An alabaster vase from the Neo-Babylonian period,[6] in the reign of Amel-Marduk (561-560) had an inscription suggesting it held one third of a ga. When reconstructed (including neck) its capacity was .27 litres suggesting that the Neo-Babylonian ga equalled .81 litres.

Calculations based on a mathematical text[10] suggest that the SÌLA in the Old Babylonian period equalled .97 litres, and Thureau-Dangin calculated from a Seleucid text that the late first millennium ga equals .84 litre.[6]

From averages taken from all these inscriptions and calculations it might seem that the SÌLA in the Early Dynastic period was about .44 litres; in the Ur III period and the Old Babylonian period around 1 litre (with a possible smaller variation at Rimah); in the Neo-Assyrian period about 1.88 (or about double the Old Babylonian SÌLA); and in the Neo-Babylonian period about .83 (or about double the Early Dynastic SÌLA).

However the situation is not quite as simple as this. If the rations in the Early Dynastic period were based on a SÌLA of around ½ a litre then the amounts issued were so low as to be on starvation level. This point was made by Thureau-Dangin in his earlier discussion on the capacity measures.[6] He suggested at that time that Entemena's vase was a votive object and that it only represented half the real capacity of the SÌLA. In this the Early Dynastic SÌLA would be .88 litres - and if only the body capacity (excluding the neck) of the vase is considered, the SÌLA would be exactly .83 (the same as the average for the two Neo-Babylonian figures).

Discussion

These calculations suggest that there was an increase in the size of the SÌLA after the Early Dynastic period. This is also suggested by the ration lists. In the Early Dynastic III period at Lagaš the most common quantities of barley rations were 72, 48, 36 and 24 SÌLA a month.[11] At Kish, Nippur, Nuzi and Asmar in the Agade period, and at Lagaš itself in the Ur III period, the most common amounts of rations were 90, 60, 40, 30 and 20 SÌLAS. These later amounts of rations continue into the second millennium.

If these amounts are compared with each other it can be seen that 60 is 5/6 of 72, 40 5/6 of 48, 30 5/6 of 36 and 20 5/6 of 24. And at first sight this would appear to mean that the rations had been reduced by one sixth - perhaps because of a fall in yields.

But this explanation is not completely satisfactory, as it does not tie-in with the capacities of the SÌLA as calculated from the inscriptions on pottery. However, if the size of the SÌLA was increased when the numbers given dropped the actual rations could have stayed the same.

Thus:

72 SÌLA at .83 litres a SÌLA = 59.76 litres (60)
48 " " " " = 39.84 " (40)
36 " " " " = 29.88 " (30)
24 " " " " = 19.92 " (20)

and 60 SÌLA at 1.0 litres a SÌLA = 60 litres

This increase represents a rise of one sixth in the size of the SÌLA and is the difference between the doubled capacity of the Entemena vase (.415 x 2 = .83) and the average of the Ur III/Old Babylonian SÌLAS (1.07).

It is here suggested that at the end of the Early Dynastic III period, at least as known from Lagaš, there was a change in accountancy procedures which caused the numbers of SÌLAS in the GUR.SAG.GÁL to be raised and an increase in the size of the SÌLA. It is possible that this latter system was already in use in Akkad and was brought into Sumer by the Sargon dynasty. The Ur III kings standardized the system which seems to have continued, with perhaps some local variations, into the second millennium. The Assyrians apparently based their measure on double the 'Babylonian' SÌLA/qa but the late Neo-Babylonian kings may have returned to the old Lagaš or Sumerian size of SÌLA/qa. These variations in the size of the SÌLA are probably simplified and there may have been local differences in much the same way as there are local differences in weights and measures in Iraq today - for example those local weights in use in Baghdad vary from those used at Basra.[12]

When calculating yields, rations etc., in this study, the Early Dynastic SÌLA will be taken to equal .83 litres and the Agade, Ur III, Isin/Larsa, Old Babylonian and Kassite/Nuzi SÌLA to be 1.0 litres. The Neo-Assyrian SÌLA will be taken as 1.88 litres. (The period covered by the Neo-Babylonian qa does not fall within this study.)

References and Notes for Appendix I

1. Thureau-Dangin F. 'Numeration et Métrologie Sumeriennes' RA 18, 1921, 135-137; ARMT VII, 349, para. 5, Postgate J.N. Neo-Assyrian Legal Documents, 67-68, para.6.3.2.; Maekawa K. Zinban 13, 1974, 45, GUR.SAG.GÀL; Gelb I.J. personal communication September 1975 (Sargonic GUR.SAG.GÀL = 240 SÌLA); see also Salonen Hausgeräte II, 270-303; Meissner BuA

2. Postgate J.N.Neo-Assyrian Legal Documents, 67-68.

3. Nissen H. 'Grabung in den Quadratent K/L XII in Uruk/ Warka' Bagh.Mitt. V, 137.

4. Some of the more elaborate styles, and jugs, have been excluded.

5. NIPPUR: McCown D & Haines R. Nippur I, Temple of Enlil... Plate 80 (nos. 1, 2, 5-9, 12, 14 18); Plate 82 (nos. 10, 12-15, 18-20 and 23); Plate 83 (Nos. 7, 9-10, 13, 14, 16-18, and 21) Plate 84(Nos. 1-6, 9-11, 16); Plate 85 (Nos. 1-4, 7-8, 11-12, 14 & 16) Plate 87 (Nos. 1-4, 8-14); Plate 88 (Nos. 3, 5-6, 19, 20-23); Plate 90 (Nos. 1-5, 12-17); Plate 94 (Nos. 1-6, 8-11, 14, 15, 18) Plate 97 (Nos. 1, 7-8, 10-12); No. 98 (Nos. 1-8, 11-12, 15-16) Plate 100 (Nos. 2, 6-7, 11, 13-14, 19-23); Plate 103 (Nos. 1, 4, 10-13, 18-25).

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Tello: de Genouillac H. Fouilles de Telloh I Plate II (Nos. 3737, 5736, 5613, 5501, 5454) Plate III (No.5293), Plate IV (No. 5430), Plate V (Nos. 4418, 4327, 4865, 4513, 4707, 3565, 4512, 5496) Plate VI (all but 5272, 4076, 4303 and 4657) Plate VII (Nos. 4605, 4603) Plate VIII (all but 4308) Plate IX (Nos. 4357, 4744, 4385, 4516) Plate X (Nos. 5297, 5298, 5356, 4858) Plate XI (Nos. 4557, 4561, 4560, and unnumbered pot) Plate XII (Nos. 590, 915, 1043, 559) Plate XIII (Nos. 587, 1925, 887)
Vol.II: Plate XXX (all plate) Plate XXXI (all except 3348 & 3613) Plate XXXII (all except 2543) Plate XXXIII (all except 905, 810, 803) Plate XXXIV (all on plate) Plate XXXV (Nos. 3011, 3146, 748) Plate XXVIII (all on plate) Plate XIX (Nos. 614, 1022, 1228)

Nimrud: Oates J. 'Late Assyrian Pottery from Fort Shalmaneser' Iraq XXI, 1959, Plates XXXV (all except Nos. 12, 14-16) Plate XXXVI (Nos. 27-28, 30-31, 33-34, 37-38, 40-41, 44, 46-47) Plate XXXVII (Nos. 60-61, 64, 78-80) Plate XXXVIII (Nos. 84, 92-94, 96-99)

Bevelled-rim bowls:(Jemdet Nasr) Mackey E. Report on the excavation of the 'A' cemetery at Kish' Plate LXVII (Nos. 22-23); de Genouillac H. Fouilles de Telloh Plate VIII (No. 4241) (Tello); UVB IV, Plate 19 At' (Warka); Starr Nuzi II Plate 50 a (Nuzi); Delougaz P. Pottery from the Diyala Plate 108 (No. C002.210) (Khafajeh); Mallowan M.E.L. 'Excavations at Brak and Chagar Bazar' Iraq IX, 1947, Plate LXVI, 4.(Tell Brak);

Many bevelled-rim pots have been excavated but only a handful have actually been published.
Although the plates listed for the above sites include vessels smaller than .11 litre and larger than 1.12 litres only those falling between these measurements have been included in the tables.

It should be noted that the pottery from Tello is not securely dated and that the divisions into periods is therefore suspect. The divisions made by the excavators have been followed.

6. Thureau-Dangin F. RA 18, 1927, 127 ff.

7. McCown D & Haines R. Nippur I, Temple of Enlil... Plate 87, No. 14 and photos. Professor Gelb kindly confirmed this calculation. With the neck included the capacity is 188.5 - 1.07 a SILA. But see Postgate J.N. 'An inscribed jar from Tell al Rimah' to be published in Iraq. Note 7: Mr. Christopher Watkins made the capacity maximum 183.1 and minimum 180.3. This would give a maximum SILA of 1.04 litre, and a minimum of 1.025 litre, and does not change the suggested SILA of approximately 1 litre in the Ur III period.

8. Dalley et al. No. 274, and Postgate J.N. 'An inscribed jar from Tell al Rimah' to be published in Iraq.

9. The method used here is the one used in examining the pottery drawings. It is based on measurements taken of the pot ND 6673 on display in the British Museum. This inscription is published by Postgate J.N. in Fifty Neo-Assyrian legal documents, Note that he calculated the SILA to be 1.84 litres. (see also Nallowan Nimrud, 168.)
J.N. Postgate's calculations of the capacity of the reconstructed inscribed vessel at Tell al Rimah give a useful comparison between two methods of calculating capacities. He filled the reconstructed vessel with dried rice, which gave a capacity of 121.3 (allowing a 2% margin of error: the maximum value was 123.5 and the minimum was 119.0 litres). From his details of the dimensions of the vessel it has been possible to calculate the capacity using the same methods as used for the pottery-drawings and the Ur III pot from Nippur. This gave a value of 123.495 litres and a SILA of .82 litre - very close to the maximum value given for the dried rice filling method.

10. Thureau-Dangin F. 'La mesure du "qa" RA 34, 1937, 81

11. It is not suggested that only these sizes of rations were issued, merely that these were the most frequently used.

12. Iraq Handbook 640-642.

APPENDIX II

Estimates of population trends

Before any attempt can be made to discuss whether a food supply is sufficient for a local population, the size of the population must be established. The most accurate way of assessing population figures is to conduct a census but this process does not appear to have been carried out in ancient Mesopotamia. A number of rulers, for example Zimri-Lim of Mari, seem to have carried out a local census (one of his years carries the name 'Year when Zimri-Lim counted the land')[1] while others, in particular of Lagaš, mention large numbers of people in their inscriptions but it is not clear whether they are referring to certain sections of the population, or to certain areas or to their states as a whole. Thus the figures they give (Entemena: 3600; Urukagina: 36,000; and Gudea: 216,000) cannot be assumed to be the population of the state of Lagaš or of the city of Girsu.[2]

Professor Frankfort attempted to calculate the population of Mesopotamia by taking the average number of houses found per acre in the excavated sites of Ur, Tell Asmar and Khafajeh and reckoning six to ten people per house. This gave a density from 120-300 people per acre, which compared well with the density of 160 per acre which he found at modern Aleppo and Damascus.

A number of settlement surveys have been carried out recently in Iraq: the regions covered include the Diyala,[3] the area around Warka,[4] and central Mesopotamia north of Nippur.[5] The periods during which the settlements were occupied were worked out on the basis of the types of pottery and other artefacts (such as clay sickles, 'nails', mud-bricks etc.) found on their surfaces. The greatest danger in this is that the pottery sequences are not always equally well known for each period and many types overlap, so that it is not always possible to say that, for example, a particular site in the Warka area, was occupied in the Isin/Larsa period but not in the Old Babylonian. However, allowing for this, distribution maps of sites can give an idea of variations in settlement patterns. In the Diyala area there appears to have been a gradual increase in settlement through the third millennium, with a slight falling-off in the Old Babylonian

period. This fall continued through the second millennium and the area would seem to have been almost deserted by the beginning of the first. In the Warka region, the early third millennium (Jemdet Nasr to Early Dynastic I) was the period with most settlement. In the late Early Dynastic III there was a fall in the number of sites although the sizes of the remaining settlements had increased. There was a continued drop in sites in the Akkadian with possibly a slight increase in the Ur III-Isin/Larsa period. The second millennium saw a gradual drop in the numbers and size of settlements, probably falling to the lowest amount in the early first millennium. The number of sites increased slightly in the Neo-Babylonian period. In central Mesopotamia the largest number of settlements date to the Ubaid/ Jemdet Nasr periods, but although there may have been a slight decrease in the number of sites in the Early Dynastic period the size of such towns as Kutha, Kish and Nippur increased. There was a slight drop in the number of sites towards the end of the third millennium but the Kassite period shows an increase. The end of the second millennium saw a drastic fall in numbers of settlements but there seems to have been an improvement during the Neo-Babylonian period, with Babylon dominating the area.

Adams made a provisional estimate of the sedentary population in the Diyala area.[6] Taking a population density of 200 per hectare he calculated that the 384 hectares of recorded settlement for the Early Dynastic period would have carried some 77,000 people. But although population estimates could be made in this manner for other periods and other areas it is not really satisfactory to use a density based mainly on modern village settlements in Khuzistan and on modern cities like Baghdad - and indeed a density which is much lower than the one computed by Frankfort from the sites of Ur, Tell Asmar and Khafejeh.

The following is an attempt to estimate a population density contemporary with the periods of the settlements, based on Frankfort's method of estimating the average number of houses on a site. This has been done by finding the average size of house, dividing this into the size of the residential area of the town to find the number of houses and multiplying this number by the average number

of people in a family. The residential area of a site is calculated from the total area of the site less an arbitary 40% to cover temples, administrative buildings, unoccupied areas etc.

A figure of 5 for the number of people in a family has been calculated from a text from Nippur giving members of families receiving rations, two from Nuzi recording some men with their wives and immediate family and the 'Doomsday' texts from Harran which give the numbers in families plus details about their property.[7]

Khafajeh Mound A.[8]

Area of site: 275,000 sq.m. Residential area: 165,000 sq.m.

Early Dynastic

Houses 10:	Average for 5 dwellings: 75.4 sq.m. No. of houses in residential area: 2188 Population estimate: (10,941.6) 10,942.
Houses 9:	Average for 8 dwellings: 71.875 sq.m. No. of houses in residential area: 2295.65 Population estimate: 11,478
Houses 8:	Average for 7 dwellings: 89 sq.m. No. of houses in residential area: 1854 Population estimate: 9270
Houses 7:	Average for 6 dwellings: 89 sq.m. No. of houses in residential area: 1854. Population estimate: 9470.
Houses 6:	Average for 3 dwellings: 202 sq.m. No. of houses in residential area: 817 Population estimate: 4085.
Houses 5:	Average for 3 dwellings: 200.66 No. of houses in residential area: 822. Population estimate: 4110
Houses 4:	Average for 11 dwellings: 124.8 sq.m. No. of houses in residential area: 1322 Population estimate: 6610
Houses 3:	Average for 5 dwellings: 232 sq. m. No. of houses in residential area: 711 Population estimate: 3555
Houses 1 & 2:	Average for 10 dwellings: 161.7 sq. m. No. of houses in residential area: 1020. Population estimate: 5100

Average population for whole period: 7180
Density over whole site: 261 per hectare.

Tell Asmar[9]

Size of Early Dynastic and Akkadian town: 35,000 sq.m.

Residential area: 21,000 sq. m.

Early Dynastic III

Stratum Vc: Average size of 4 houses: 126.5 sq.m.
No. of houses in residential area: 116
Population estimate: 830.

Stratum Vb: Average size of 6 houses: 133.8
No. of houses in residential area: 157
Population estimate: 785.

Stratum Va: Average size of 25 houses: 105.48
No. of houses in residential area: 199
Population estimate: 995.

Average population: 870

Density over whole site: 248.5 per hectare.

Akkadian

Stratum IVb: Average size of 7 houses: 123.57
No. of houses in residential area: 170
Population estimate: 850

Stratum IVa: Average size of 9 houses: 192.55
No.of houses in residential area: 109.
Population estimate: 545.

Average population: 698

Density over whole site: 199 per hectare.

Ur III/ Isin-Larsa

Size of town: 250,000 sq. m. Residential area: 150,000 sq.m.

Stratum III: Average size of 4 houses: 147.5
No. of houses in residential area: 1017.
Population estimate: 5085.

Density over whole site: 203 per hectare.

Tell Harmal.[10]

Size of site: 17,600 sq.m. Residential area: 10,560 sq. m.

Isin/Larsa-Old Babylonian

Average size of 16 houses: 72.5
No. of houses in residential area: 146.
Population estimate: 730.

Density over whole site: 415 per hectare.

Nippur[11]

Size of site: 1,057,500 sq.m. Residential area: 634,500 sq.m.

Ur III

TB Level IV: Average size of 3 houses: 158.66 sq. m.
No. of houses in residential area: 3,999
Population estimate: 19,995.

Density over whole site: 189 per hectare.

Isin-Larsa

TB Level II: Average size of 3 houses: 172.66 sq.m.
No. of houses in residential area: 3,675.
Population estimate: 18,375.

TB Level I_1: Average size of 4 houses: 131.5 sq.m.
No. of houses in residential area: 4825.
Population estimate: 24,125.

TA Level XII: Average size of 3 houses: 99.33 sq.m.
No. of houses in residential area: 6,388
Population estimate: 31,940.

Average population: 23,436.

Density over whole site: 221.6 per hectare.

Old Babylonian

TB Levels E & D: Average size of 4 houses: 122.5 sq.m.
No. of houses in residential area: 5180
Population estimate: 25,9000.

TA Levels X_{3-2}: Average size of 5 houses: 65.4 sq.m.
No. of houses in residential area: 9702.
Population estimate: 48,510.

Average population: 37,205

Density over whole site: 352 per hectare.

Kassite

TA Level VI: Average size of 1 house: 44 sq. m.
No. of houses: 14,420
Population estimate: 72,100.

Density over whole site: 682 per hectare.

Assyrian

TA Level V: 1 house: 90 sq.m.
IV: 1 house: 182 + sq. m.
III: 1 house: 177 sq. m.
Average size: 150 sq.m.
No. of houses in residential area: 4230.
Population estimate: 21,150

Density over whole site: 200 per hectare.

Chagar Bazar[12]

Size of site: 120,000 sq.m. Residential area: 72,000 sq.m.

Old Babylonian — Average size of 5 houses: 78.5 sq.m.
No. of houses: 917
Population estimate: 4585.

Density over whole site: 382 per hectare.

Nuzi[13]

Size of site: 45,000 sq.m. Residential area: 27,000 sq.m.

Average size of 20 houses: 153.7 sq.m.
No. of houses in residential area: 176
Population estimate: 880

Density over whole site: 196 per hectare.

Ur

Size of site: 593,750 sq. m. Residential area: 356,250 sq.m.

Isin-Larsa[14] — Average size of 33 houses: 131.9 sq.m.
No. of houses in residential area: 2701
Population estimate: 13,505.

Density over whole site: 229 per hectare.

Kassite[15] — Average size of 4 houses: 159 sq.m.
No. of houses in residential area: 2241
Population estimate: 11,205

Density over whole site: 190 per hectare.

Neo-Babylonian[16] — Average size of 6 houses: 763.4 sq.m.
No. of houses in residential area: 467
Population estimate: 2335.

Density over whole site: 40 per hectare.

Nimrud[17]

Size of site: 3,600,000 sq.m. Residential area: 2,160,000 sq.m.

Neo-Assyrian — Average size of 4 houses: 137.5 sq.m.
No. of houses in residential area: 15,709.
Population estimate: 78,545.

Density over whole site: 218 per hectare.

Uruk[18]

Size of site: 5,060,000 sq.m. Residential area: 3,036,000 sq.m.

800-600BC — Average size of 6 houses: 213.4 sq.m.
No. of houses in residential area: 14,227.
Population estimate: 71,135.

Density over whole site: 141 per hectare.

If the densities calculated above are put to the areas of settlement surveyed in the Diyala, Warka region and central Mesopotamia, it may be possible to gain an idea of the comparative size of the population. The settlement areas have been taken from the sizes of sites given in the regional surveys. For the Diyala Adams gave these sizes himself[19] but for the Warka and central Mesopotamia regions the areas had to be calculated from the measurements published in the catalogues.[20] The sites have been grouped into the main dating periods for which evidence was found on the surface. Problems here include the above mentioned difficulty of dating material and the fact that no variations in size could be made according to the extent of occupation. In other words a site of 50 hectares with dating material from the Early Dynastic to Kassite periods has had to be counted as 50 hectares for all these intervening periods, although it may only have been 10 hectares during Ur III and 2 hectares in the Kassite.

Where possible the population density is taken from a town (or average of towns) in the particular area. If this is not possible, then the density from the nearest town has been taken. In addition an average density per period has been worked out.

Diyala area

(The densities have been taken from an average of the figures for Tell Asmar and Khafajeh in the Early Dynastic period, from Tell Asmar in the Akkadian period, from an average of Tell Asmar and Tell Harmal in tue Ur III/Isin-Larsa and Old Babylonian periods, from Nippur and Nuzi in the Kassite period and from Nippur in the Neo-Assyrian and Neo-Babylonian periods)

Period	Settlement area	Est.Population	Density
Early Dynastic	384 hectares	97,920	255
Akkadian	403 "	80,197	199
Ur III/Isin-Larsa	462 "	142,758	309
Old Babylonian	380 "	117,420	309
Kassite	230	100,970	439
Neo-Assyrian/ Neo-Babylonian	75 "	15,000	200

Warka area

(The densities for the Warka region have been taken from an average of Khafajeh and Asmar for the Early Dynastic period, from Asmar for the Akkadian period and Ur III period, from Ur for the Isin/Larsa and Old Babylonian periods and Kassite period, and from Warka itself for the Neo-Assyrian/Neo-Babylonian period. Estimated areas for Warka, Larsa and Shuruppak have been added to the settlement areas listed in the survey catalogue.)

Period	Settlement area	Est.Population	Density
Early Dynastic III	1536.4 hectare	391,782	255
Akkadian	1420.5 "	282,680	199
Ur III	2042 "	414,526	203
Isin/Larsa	1831 "	419,299	229
Old Babylonian	1440.6 "	329,870	229
Kassite	1073 "	203,870	190
Neo- Assyrian/ Neo-Babylonian	1004 "	141,564	141

Central Mesopotamia

(The densities have been taken from an average of Khafajeh and Asmar for the Early Dynastic III, from Asmar for the Akkadian period and from Nippur for all the others. An estimated area for Babylon has been added to Gibson's survey around Kish and Adams' survey in ancient Akkad)

Period	Settlement area	Est.Population	Density
Early Dynastic III	733.3 hectares	186,992	255
Akkadian	904 "	179,896	199
Ur III	902 "	170,478	189
Isin/Larsa	908 "	201,213	221.6
Old Babylonian	1102 "	387,904	352
Kassite	1804.5 "	1,230,669	682
Neo-Assyrian/ Neo-Babylonian	1267.6 "	253,520	200

Population estimates based on average densities (from appropriate sites)

Period	Cent.Mesopotamia	Warka	Diyala	Density
Early Dynastic	186,992	391,782	97,920	255
Akkadian	179,896	282,680	80,197	199
Ur III	177,968	400,232	90,552*	196
Isin/Larsa	242,436	488,877	123,354*	267
Old Babylonian	422,066	551,750	145,540	383
Kassite	642,402	381,988	81,880	356
Neo-Assyrian/ Neo-Babylonian	190,140	150,600	11,250	150

(* The areas for the Ur III and Isin/Larsa in the Diyala regions are the same as they were lumped together by Adams.)

Total population in survey areas (based on average densities)

Early Dynastic	Akkadian	Ur III	Isin/Larsa	Old Babylonian	Kassite	Neo-Assyr. Neo-Babyl.
676,694	542,773	668,752	854,667	1,119,356	1,106,270	351,990

These population figures do not cover the whole of Mesopotamia nor even the whole of the alluvial plain. The most noticeable gaps in the south are the area around Bismaya between the Central Mesopotamian and Warka surveys, the Ur and Eridu areas and the Girsu-Lagaš region, nor has there been any allowance for any nomadic population. However if the average density for all periods in the southern areas (264) is compared with the average density for Chagar Bazar (Old Babylonian), Nuzi (mid-second millennium) and Nimrud (Neo-Assyrian) (265) it can be seen that these are almost the same so that it is possible that the populations were also about the same. Thus if the population is doubled to cover the northern areas, and then a third of the southern population is added to cover other unsurveyed areas plus the nomadic population some idea may be gained of the population for the whole of Mesopotamia. It must be stressed that this is only tentative as the doubling of the population implies that periods of expansion and adversity in the south were mirrored in the north.

Early Dynastic	Akkadian	Ur III	Isin/Larsa	Old Babylonian	Kassite	Neo-Assyr. Neo-Babyl.
1,578,953	1,266,470	1,560,421	1,994,223	2,611,831	2,581,297	821,310

Some points of criticism should be noted; while historically the end of the third millennium and the beginning of the second were prosperous with flourishing trade from all parts of Mesopotamia and many vigorous kingdoms in existence (Mari, Babylon, Rimah, Aššur etc.) the following period is not usually considered to be so stable. The high population figures for the Kassite period may be biased by the high density figure found at Nippur for this period, which was based on the measurement of only one house and may therefore give a completely false impression. However the Kassite dynasty in the south was the longest reigning dynasty in the history of Mesopotamia and this alone should have provided some stablitiy. This period is paralleled in the north by the rise of the Assyrian state. The drastic drop in population, between the end of the Kassite period (c.1220) and the 9th century may only apply to the south. The figures certainly seem low for the Assyrian kingdom in the north.

A contemporary population estimate exists for the city of Nimrud dated to around 875-867 BC. Aššurnaṣirpal gave a feast when the city of Nimrud was completed and set up a stele to commemorate the event.[21] In this he states that his feast was for 69,574 people made up of 16,000 'citizens' of Nimrud, 47,074 workmen and women from all the lands under the king, 5,000 officials also from the neighbouring states and 1,500 officials from the royal palaces. Although it is not clear whether the 16,000 were the original inhabitants of Nimrud before the king began to build it as his capital city or whether the 47,074 workmen and women and all the officials had become permanent residents in the city, the figure of 69,574 compares well with the total of 78,545 estimated from the house plans. This large population is reflected in the Neo-Assyrian inscriptions recording the numbers of towns and villages listed as being conquered by their armies.[22]

Before completing this appendix on population estimates mention must be made of Professor Gelb's comments that the average house size in Mesopotamia was 35.3 sq.m. or one sar,[23] and that the estimated averages of the archaeologists based on the excavated plans are incorrect possibly because these houses were owned by nobility and high officials and did not cover a sufficient range of size. The average size of house in the above calculations is 159.29 sq.m. and the size of house measured varied from under 30 sq.m. to over 700. For example at Ur in the Isin/Larsa period two houses of 36 sq.m. (VI, and VIII) on Straight Street and one of 28 sq.m. (VI) existed on Store Street. At the other end of the scale a house of 330 sq.m. (IV) was found on Paternoster Row. This variation in size was found at other sites: at Khafajeh (Houses 4, J42:2) a house of 35 sq.m. was measured while another was c.300 (XXXVIII) and in Houses I & 2 the sizes varied from 528 sq. m to 64 and 55 sq.m. A number of houses in the region of 42-48 sq.m. were found at Asmar, Stratum Va mixed with others of 248, 242, 154 etc., and this can be seen for all the sites where a number of houses could be measured. Thus it would seem that the houses excavated cover a wide range of size. It is

difficult to believe that there were enough houses under 35 sq.m. in size (a very small area indeed) to counteract the larger houses to bring the average down to one sar. Could it be that the documents of sale from which the average of one sar is taken refer not to whole houses but to rooms or groups of rooms?

If Professor Gelb's contention that the average size of house in Mesopotamia was 35.3 sq.m. is correct this would raise the population figures substantially. As examples, the population of Tell Asmar (Early Dynastic and Akkadian town) would be 3000, Nippur 90,642, Ur 50,893, Warka 433,714 and Nimrud 308,571. (Densities of 857 per hectare). The last two in particular would seem to be a little high.

At present the differences between the archaeological and philological evidence cannot be resolved and for the purpose of this study the figures on page 20 will be used to consider the agricultural resources and the ability of the land to supply the local population.

References and notes for Appendix II

1. Dossin G. Les noms d'années et éponymes dan les 'Archive de Mari'

2. Frankfort H. Kingship and the Gods, 396, note 23.

3. Adams Diyala

4. Gibson M. City and Area of Kish including Appendix V 'Settlement and irrigation patterns in ancient Akkad' by R. Adams, 182.

5. Uruk Countryside.

6. Adams Diyala 41

7. Nuzi: HSS XVI No. 392 Average 4.5
HSS XVI No. 402 " 5
Nippur: BE XIV No. 58 " 4.33
Assyria: Johns Doomsday Book: Nos. 1, 2, 3, 4, 6, 8, 11: Average 4.33
Averages: 4.54 - rounded up to 5.

8. Delougaz P, Hill H.D, Lloyd S. Private Houses and Graves in the Diyala, 276, Table II. Details of plans for Khafajeh and Tell Asmar sites taken from Plate 1 and Plate 23.

9. ibid., 196 and Plate 23 re the excavation of a pre-Larsa wall.

10. Baqir T. 'Tell Harmal, a preliminary report' Sumer II 1946, Plate before p.31.

11. McCown D, and Haines R. Nippur I, Temple of Enlil... Plates 5, 59, 61, 63, 64, 70B, 74 A & B, 75 A & B.

12. Mallowan M.E.L. 'Excavations at Tall Chagar Bazar' Iraq IV, 1937, Figs 12 & 5.

13. Starr Nuzi II, Plans 2 & 13.

14. Woolley C.L. 'Excavations at Ur 1930-31' Antiquaries Journal Vol. XI, 1931, 359-368, Plate XLVII

15. UE VIII Plate 63 A & 63 B.

16. UE IX Plate 71.

17. Mallowan Nimrud I, Plan on p.185.

18. UVB 21, Plates 27 & 28.

19. Adams Diyala, Tables 11-16.

20. Gibson M. City & Area of Kish, 118-158, 182-208. Uruk Countryside

21. Iraq XIV, 44, lines 142-148.

22. Luckenbill D.D. Ancient Records of Assyria and Babylonia,
I, 57, para.164: Tukulti-Ninurta Year 1:
28,800 Hittite warriors captured.
146, para.445: Aššurnaṣirpal Year 1:
City of Kinabu, 600 warriors slain and 3000 captives burned.
149, para.443: Aššurnaṣirpal Year 3:
1,460 warriors slain, 12,000 soldiers captured east of the Tigris.
153, para.455: Aššurnaṣirpal Year 3:
6 forts and 150 'towns' listed for the state (?) of Ameka in the campaign against Zamua.
II, 129 para. 257: Sennacherib's 1st campaign:
80,000 bowmen in the army of Merodach Balodan of Babylon.

23. Gelb I.J. 'Quantitative Evaluation of slavery and serfdom' Kramer Anniversary Volume, AOAT 25, 197-198.

APPENDIX III

Selected Vocabulary

		Page in Volume I
abūt nāri/UBI.ÍD.DA.KU$_6$	River-UBI-fish (type of barbel)	172
abūt tâmti/UBI.A.AB.BA.KU$_6$	Sea-water-UBI-fish - Polydactylus tetradactylus	172
agargarû/AGARGARA, NUN.KU$_6$	shad (Hilsa ilisha)	173
aj(j)alu/DÀRA.BAR	?fallow deer	161
akalu, aklu/NINDA, NINDA.MEŠ, NINDA.HI.A.	bread	124
alappānu/KAŠ.U.SA ZÍZ.A.AN	special beer	144
alpu/GU$_4$	ox	99
appānu	type of chick pea	261
apsasû/AB.ZA.ZA	?water buffalo	103
armannu/GIŠ.ḪAŠḪUR.KUR.RA	'apricot'	210
arnabu/A.GÀR.EDIN.NA, KA.EDIN.NA	hare	164
arsānu	?burghul-like product	111
arsuppu/EŠTUB.KU$_6$	Barbel (Barbus (Puntius) sharpeyi Gunther)	170
azupīru/Ú.ḪUR.SAG	?saffron	222
bappiru/BAPPIR	beer bread	137
billatu/KAŠ.Ú.SA (DIDA)	common beer	141
buqlu/MUNU$_4$	green malt	136
burāšu/GIŠ.(ŠIM).LI	pine-nut	217
butuntu/GIŠ.LAM.GAL	pistachio nut	217
DAR.RA	dried	174
dišiptuḫḫu/KAŠ.U.SA ZÍZ.A.AN	?sweetened beer, made from emmer wheat	143
dišpu/LÀL	honey, also date syrup	225

DUG.NÍG.DÚR.BÙR	fermenting vat with draining hole at bottom.	147
duḫnu, tuḫnu	millet	43
ellu/Ì.GIŠ	vegetable oil (see šamnu)	199
enzu/ÙZ	she-goat, goat	98
epinnu/GIŠ.APIN	seeder plough	68
eqīdu	type of cheese	186
erbu/$BURU_5$	locust	164
GA.ḪAR	cheese	185
GA.ḪAR KAS_x(GAZI)	?spiced cheese	186
gaj(j)ātu	type of cereal	88
GA.ŠE.A	?cheese mixed with barley or barley & milk gruel	186
$GA.SIG_7$.A	dairy product	186
GÌR.LAM	?cake	126
gukkallu/GUKKAL (UDU.ḪUL)	fat-tailed sheep (Type 3)	97
GU_4 madlute	?salted beef or stuffed beef rolls?	154
GÚ.SAR	?dried or green pulse	258
ḫaḫḫu/GIŠ.ŠENNUR (KIB) GAL	?plum	215
ḫalāṣu	to press	201
ḫallūru/GÚ.GAL	chick pea	192
ḪA.MUŠ	?eel	173
ḫarbu/GIŠ.APIN.TUK.KIN, GIŠ.APIN.ŠU.KIN	plough used to break up soil (see majāru)	68
ḫassū/ḪI.IS.SAR	lettuce	196
ḫašḫūru/GIŠ.ḪAŠḪUR	apple	209
ḫašû/Ú.ḪAR.ḪAR	?thyme	223
ḫazannu	onion, or garlic	190
ḫimētu/Ì.NUN	ghee	185

ḫimri	fermented drink made from barley and fruit at Mari.	291
ḪI+SUHUR	type of barbel.	172
Ì.ÁB	?cream	198
Ì.GIŠ sirdi	olive oil	204
Ì.KU$_6$	fish oil or a type of fish	198
isqūqu/ZÌ.KUM	semolina or burghul-type prodcut	113
kakkû/GÚ.TUR	lentils	192
kakkullu/GAKKUL	mash tub (see namzītu)	147
kamiššaru/GIŠ.ŠENNUR (KIB).KUR.RA	pear	215
kamūnu/Ú.DIN.TIR, GA.MUN	cumin	220
karānu/(GIŠ).GEŠTIN	grapes, wine, vine	227
karašu/GA.RAŠ(.SAR)	leek	190
kasû/GAZI	?mustard	221
KAŠ.GÍG	dark beer	140
KAŠ.KAL	strong beer	140
KAŠ.SI$_4$	red-brown beer	140
KAŠ.SUR	filtered beer	140
kibtu/GIG	'bread-wheat'	42
ki.KAxSAR.KU$_6$	sea-fish (Pampus argenteus) (Arab. subeidi)	172
kisibirru/(Ú)ŠE.LÚ(.SAR)	coriander	219
kuddimmu	plant used to produce salt or alkali.	225
kunāšu/ZÍZ	emmer wheat	42
KU$_6$.NE	fresh fish (KU$_6$.BIL), masgoof (smoked fish)(KU$_6$.IZI)	175
kuniḫu	onion	190
kuppû/GÚ.BÍ.KU$_6$	?eel	173
kurangu/Ú.ŠE.LI.A	?rice	43

kurkû/KUR.GI.MUŠEN	goose	179
kusāpu/NINDA.MEŠ	bread	125
laptu/LU.ÚB.SAR	turnip	195
laptu/ŠE.SA	roasted barley	110
lipû/Ì.UDU	mutton fat	198
littu/ÁB	cow	99
lulīmu/LULIM	?red deer	161
majāru/GIŠ.APIN.ŠU.KIN GIŠ.APIN.TUK.KIN	plough used to break up soil (see ḫarbu)	68
malāku	cut of meat	150
mundu/NÍG.ÀR.RA	semolina (see simdu)	110
mutāqu/NINDA.KU_7.KU_7.	'sweet pastry'	127
nāḫum/Ì.ŠAḪ	pig fat	198
namzītu/GAKKUL	mash tun (see kakkullu)	147
nappītu/GI.MA.AN.SIM	reed sieve	118
naptan šarrim/NÍG.DU.LUGAL	meal for the king	244
naspanu/GIŠ.ÙR.ÙR.RA	harrow	71
nassabu	?artichoke	195
NINDA emsu	'sour' bread	125
NINDA.KUM	flat tannour-type bread	125
NINDA mersu/NINDA.Ì.DÉ.A	'sweetened bread'	126
NINDA mutqû/NINDA.LÀL.LÀL	'sweet cake or bread'	127
NINDA sammīdātum	bread from semolina	111
nīnû/Ú.KUR	Bishop's Weed (Ammi Visnaga)	222
nurmû/GIŠ.NU.UR.MA	pomegranate	209
pappāsu	coarsely crushed grain from which malted dishes or bread can be made.	113
paspasu/UZ.TUR.MUŠEN	duck	179
purādu/ŠUḪUR.KU_6	barbel (Barbus esocinus (Heckel))	171
qadû/MUŠEN.ḪUL.A.MUŠEN, URU.ḪUL.A.MUŠEN	sandgrouse (Pterocles alchate)	180
qēmu/ZÌ	flour	117

raqqu/BAL.GI.KU$_6$	turtle/tortoise (see šeleppû)	173
saḫlû/ZAG.ḪI.LI.SAR	cress	194
samādu	to grind	111
samēdu/NAGA	plant whose ashes are used as a salt replacement	224
sasqû/A.TIR (EŠA)	dish made from semolina, mixed with water, milk or oil.	112
simdu/NÍG.ÀR.RA	semolina (see mundu)	118
sukannīnu/TU.KIL(GUR$_4$)	dove or pigeon	180
sulumḫû/UDU.SÍG.SUD	wool-coated sheep (Type 2)	96
suluppu/ZÚ.LUM	date	205
summatu/TU.MUŠEN	dove or pigeon	180
SU.SU	smoked	175
sabītu/MAŠ.DA	gazelle	160
saḫātu	to press	201
sulāmu, sallāmtu/ DAR.MÉ.LUḪ.ḪA.MUŠEN	?domestic hen	180
šaḫû/GIR.KU$_6$	sea-fish (Caranx serfasciatus)	171
šaḫû/ŠAḪ, ŠÁḪ	pig	154
šakāku	to harrow	71
šallūru/GIŠ.ŠENNUR (KIB)	?plum	215
šamaškillum/SUM.SIKIL	onion (or garlic)	190
šamaššammū/ŠE.GIŠ.Ì	?linseed	199
šambaliltu/Ú.SULLIM.SAR	fenugreek	222
šamnu/Ì.GIŠ	vegetable oil (see ellu)	199
šebēru	to level	71
šeleppû/BAL.GI.KU$_6$	turtle/tortoise (see raqqu)	173
ŠE+SUḪUR	sea-fish (Polydactylus dactylus)	172
še'u/ŠE	barley	42
šikāru/KAŠ	beer	136
šimru/Ú.ḪA	fennel	223

šizbu/GA	milk, sour milk	185
šūmu/SUM	garlic (or onion)	190
tarlugallu/DAR.LUGAL.MUŠEN	male of domestic hen?	180
tarru/DAR.MUŠEN	?domestic hen	180
tinūru/IM.ŠU.NIGÌN.NA, UDUN.MUḪALDIM	ovens	134
titāpu/TITAB	malted beer-bread	137
tittu/GIŠ.PEŠ(MA)	fig	208
ṭabtu/MUN	salt	223
uḫinnu	green dates	212
UKUŠ	cucumber	195
ulušinnu/KAŠ.ZÍZ$_{11}$ KAŠ.DIN.GÍG	beer with emmer-wheat in it.	141
uriṣu/MAŠ	goat	98
zibû/Ú.DIN.TIR.GE$_6$	black cumin (Nigella sativa)	220
ZÌ.UTU	milk and flour gruel	185
zimzimmu/SUM.ḪUŠ.A	type of onion	190
ZÌ sammīdātum	flour from semolina	111
ZÍZ.GA	kushuk - wheat and milk porridge	185

Figure 1 NUTRITION CHART FOR MESOPOTAMIA

Barley rations for a 30-day month; daily intakes

Barley SÌLA p.m.	SÌLA p.d.	Litres	Kgs.	100g.	Calories	Protein g	Calcium m.g.	Iron m.g.	Vit.A R.E.* micr.g	Thiamin m.g.	Ribo-flavin m.g.	Vit.C m.g.	Niaci. m.g.
(1 SÌLA = 1 litre: 1 litre = .765 kgs. weighed barley grains)													
90	3	3	2.295	23	8280	223	1150	92	Ø	8.74	4.6	Ø	165.6
80	2.66	2.66	2	20	7200	194	1000	80	Ø	7.6	4	Ø	144
65	2.16	2.16	1.65	16.5	5940	160	825	66	Ø	5.94	3.3	Ø	118.8
60	2	2	1.53	15	5400	145.5	750	60	Ø	5.7	3	Ø	108
50	1.66	1.66	1.27	12.5	4500	121.25	625	50	Ø	4.75	2.5	Ø	90
40	1.33	1.33	1	10	3600	97	500	40	Ø	3.8	2	Ø	72
30	1	1	.765	7.5	2700	72.75	375	30	Ø	2.85	1.5	Ø	54
25	.83	.83	.63	6	2160	58.2	300	24	Ø	2.28	1.2	Ø	43.2
20	.66	.66	.5	5	1800	48.5	250	20	Ø	1.9	1	Ø	36
15	.5	.5	.383	4	1440	38.8	200	16	Ø	1.52	.8	Ø	28.8
14	.466	.466	.356	3.5	1260	33.95	175	14	Ø	1.33	.7	Ø	25.2
10	.33	.33	.25	2.5	900	24.24	125	10	Ø	.95	.5	Ø	18
5	.16	.16	.12	1.2	432	11.6	60	4.8	Ø	.45	.24	Ø	8.6
4	.133	.133	.1017	1.02	367	9.89	51	4.08	Ø	.39	.2	Ø	7.3
(1 SÌLA = .83 litre: 1 litre = .765 kgs. weighed barley grains)													
96	3.2	2.66	2	20	7200	194	1000	80	Ø	7.6	4	Ø	144
72	2.4	2	1.53	15	5400	145.5	750	60	Ø	5.7	3	Ø	108
48	1.6	1.33	1	10	3600	97	500	40	Ø	3.8	3	Ø	72
36	1.2	1	.765	7.5	2700	72.75	375	30	Ø	2.85	2	Ø	54
24	.8	.66	.5	5	1800	48.5	250	20	Ø	1.9	1	Ø	36
18	.6	.5	.383	4	1440	38.8	200	16	Ø	1.52	.8	Ø	28.8
12	.4	.33	.25	2.5	900	24.25	124	10	Ø	.95	.5	Ø	18

* = Retinol equivalents

Figure 2 EXCERPTS FROM THE FAO RECOMMENDED TABLES OF INTAKES: HANDBOOK ON HUMAN NUTRITIONAL REQUIREMENTS

FAO Nutritional Series No.28, 1974, Table 1

Age	*Calories*	*Protein*	*Vit.A*	*Vit.D*	*Thiamin*	*Ribo-flavin*	*Niacin*	*Ascorbic acid*	*Calcium*	*Iron*	*Folic acid*	*Vit.B12*
		g.	*mcr.g.*	*mcr.g.*	*m.g.*	*m.g.*	*m.g.*	*m.g.*	*g.*	*m.g.*	*mcr.g.*	*mcr.g.*
Children												
<1	820	14	300	10	.3	.5	5.4	20	.5-.6	5-10	60	.3
1-3	1360	16	250	10	.5	.8	9.0	20	.4-.5	5-10	100	.9
4-6	1850	20	300	10	.7	1.1	12.1	20	.4-.5	5-10	100	1.5
7-9	2190	25	400	2.5	.9	1.3	14.5	20	.4-.5	5-10	100	1.5
Male adolescents												
10-12	2600	30	575	2.5	1.0	1.6	17.2	20	.6-.7	5-10	100	2
13-15	2900	30	725	2.5	1.2	1.7	19.1	30	.6-.7	9-18	200	2
16-19	3070	38	750	2.5	1.2	1.8	20.3	30	.5-.6	5- 9	200	2
Female adolescents												
10-12	2350	29	575	2.5	.9	1.4	15.5	20	.6-.7	5-10	100	2
13-15	2490	31	725	2.5	1.0	1.5	16.4	30	.6-.7	12-24	200	2
16-19	2310	30	750	2.5	.9	1.4	15.2	30	.5-.6	14-28	200	2
Adult male moderately active	3000	37	750	2.5	1.2	1.8	19.8	30	.4-.5	5- 9	200	2
Adult female moderately active	2200	29	750	2.5	.9	1.3	14.5	30	.4-.5	14-28	200	2

Figure 3

NUTRITIONAL VALUE OF BARLEY FROM FOOD COMPOSITION: TABLES FOR USE IN THE MIDDLE EAST, SECTION I, COMPOSITION OF FOODS, 100 grams, edible portion

	Food Energy Content	*Protein* g.	*Calcium* m.g.	*Iron* m.g.	*Retinol equiv.* mcr.g.	*Thiamin* m.g.	*Ribo-flavin* m.g.	*Niacin* m.g.	*Vit.C* m.g.	*Waste* g.	*Fibre* g.	*Fat* g.	*Ash* g.	*Water* g.
BARLEY	360	9.7	50	4	Ø	.38	.20	7.2	Ø	0	6.5	1.9	2.5	10.5

Figure 4 COMPARISON OF SELECTED PROFESSIONS (Daily barley rations in litres)

	ED III		AGADE		UR III		OLD BABYLONIAN						MID-SECOND MILLENNIUM				
							Chagar Bazar		Mari		Rimah		Nuzi		Nippur		
	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	
Carpenter	A p.2	2	B 163	2									K 593	.66			Carpenter
Carpenter		1															Carpenter
Tanner	A p.2	2					G A920.7	1.33	H 24	2					L 96	1.66	Tanner
Tanner		1								1.33							Tanner
Brewer	A p.2	2	B 163	3						2					N 58	2	Brewer
Brewer	A p.99	1.33													L 96	1.66	Brewer
Gardener	A p.5	2.66											K 593	.66			Gardener
Gardener		2					G A988.42	1.33									Gardener
Gardener	A p.2	1.33						1									Gardener
Cowman	A p.7	2			D 1329	2	G A988.42	1.33	H 25	3							Cowman
Cowman	A p.5	1.3								2							Cowman
Cowman	A p.2	1															Cowman
Shepherd	A p.2	2					G A988.42	1.33	H 24	2			K 593	.66			Shepherd
Pigman	A p.2	2	B 42	1.33			G A988.42	1.33									Pigman
Cook	A p.2	2					G A988.42	1	H 25	3			K 593	.66			Cook
Cook	A p.3	1								2			K 593	.66			Cook
Upholsterer	A p.2	2	C 34	2 (f)					H 24	2							Upholsterer
Upholsterer	A p.84	1.33		1.33													Upholsterer
Upholsterer	A p.84	1															Upholsterer
Tailor			B 163	2					H 25	3	J 167	1.66	K 593	.66	L 96	1	Tailor
Tailor			B 163	1.33					H 25	2	J 167	1.33					Tailor
Tailor			B 163	1							J 167	3.5					Tailor
AGRIG-steward	A p.43	1.33					G A993.44	1.33 (f)	H 25	2 (f)							AGRIG-steward
AGRIG-steward	A p.43	1					G A993.44	.66 (f)									AGRIG-steward
AGRIG-steward	A p.43	.66															AGRIG-steward
Barber	A p.90	1.33	B 163	3													Barber
Barber (f)	A p.18	.5															Barber
Scribe	A p.2	2							H 24	2			K 593	.66	L 96	3.33	Scribe
Weaver			B 3	2 (f)	E 17	1.33	G A920.7	1 (f)	H 25	2 (f)	J 165	1.33 (f)	K 593	.66	L 96	3.33	Weaver
Weaver			B 3	1.33 (f)		1 (f)	G A920.7	1.66 (f)	H 25	1.66 (f)	J 165	1 (f)			L 96	2	Weaver
Weaver							G A920.7	1.33 (f)	H 25	1.33 (f)							Weaver
Miller					F 108	1 (f)	G A987.44	.66 (f)	H 25	1.33 (f)	J 166	1.33			N 58	2	Miller
Miller							G A987.44	1 (f)			J 166	1					Miller
Porter	A p.5	2	C 34	1	E 355	1	G A987.41	1.33	H 24	2	J 167	1			N 58	2	Porter
Porter							G A987.41	.66 (f)									Porter

A = Or.34/35 - Lagas
B = MAD I - Asmar
C = Westenholz Jena - Nippur
D = UET 3 - Ur
E = TCS I
F = SACT II

G = Iraq 7
H = ARM IX
J = Dalley
K = HSS XIV
L = BE XV
N = BE XIV

f = female

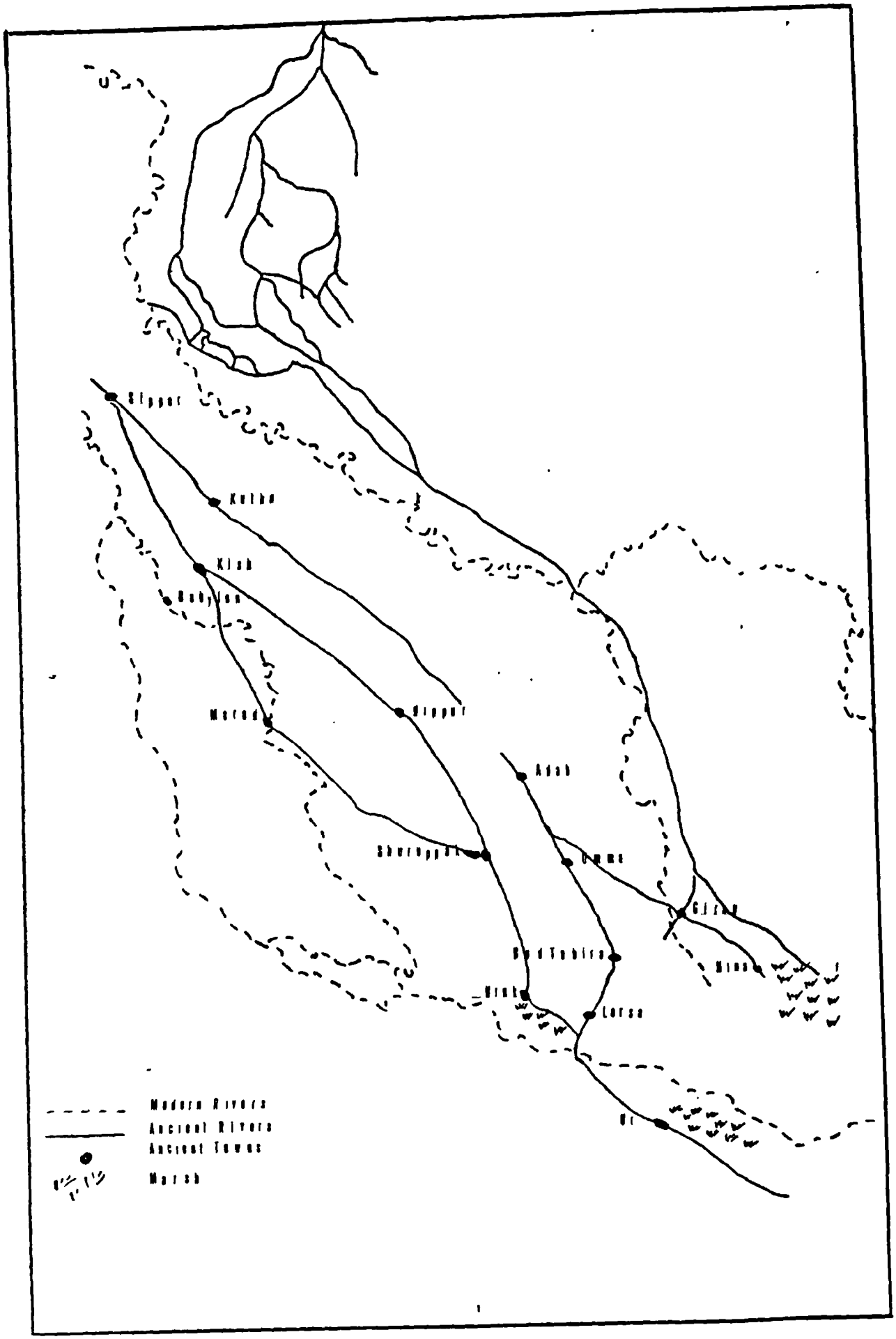

Fig.5

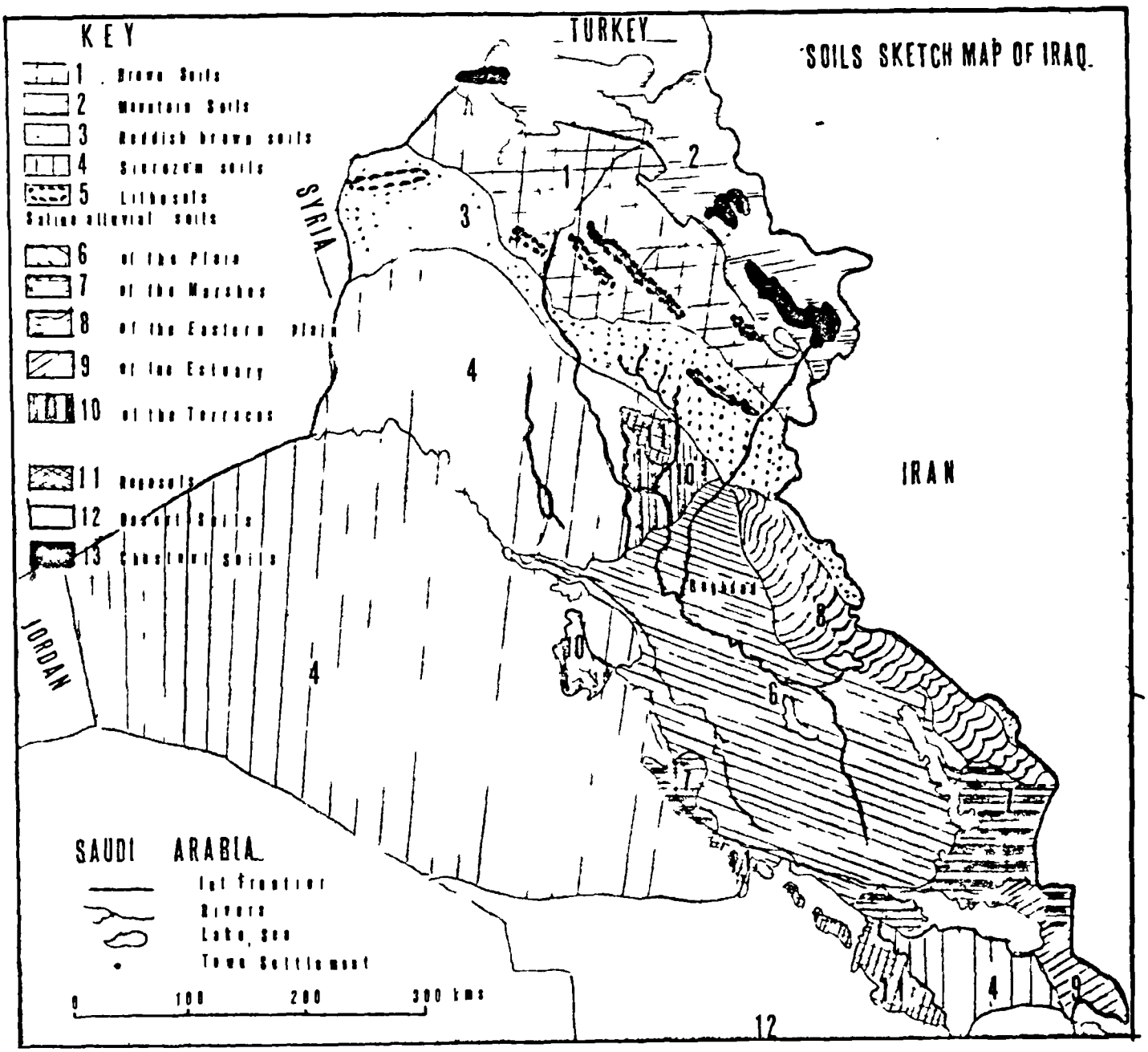
KEY
1 Brown Soils
2 Mountain Soils
3 Reddish brown soils
4 Sierozem soils
5 Lithosols
Saline alluvial soils
6 of the Plain
7 of the Marshes
8 of the Eastern plain
9 of the Estuary
10 of the Terraces
11 Regosols
12 Desert Soils
13 Chestnut Soils
TURKEY
SOILS SKETCH MAP OF IRAQ
SYRIA
IRAN
JORDAN
SAUDI ARABIA
Int frontier
Rivers
Lake, Sea
Town Settlement
0 100 200 300 kms

Fig.6

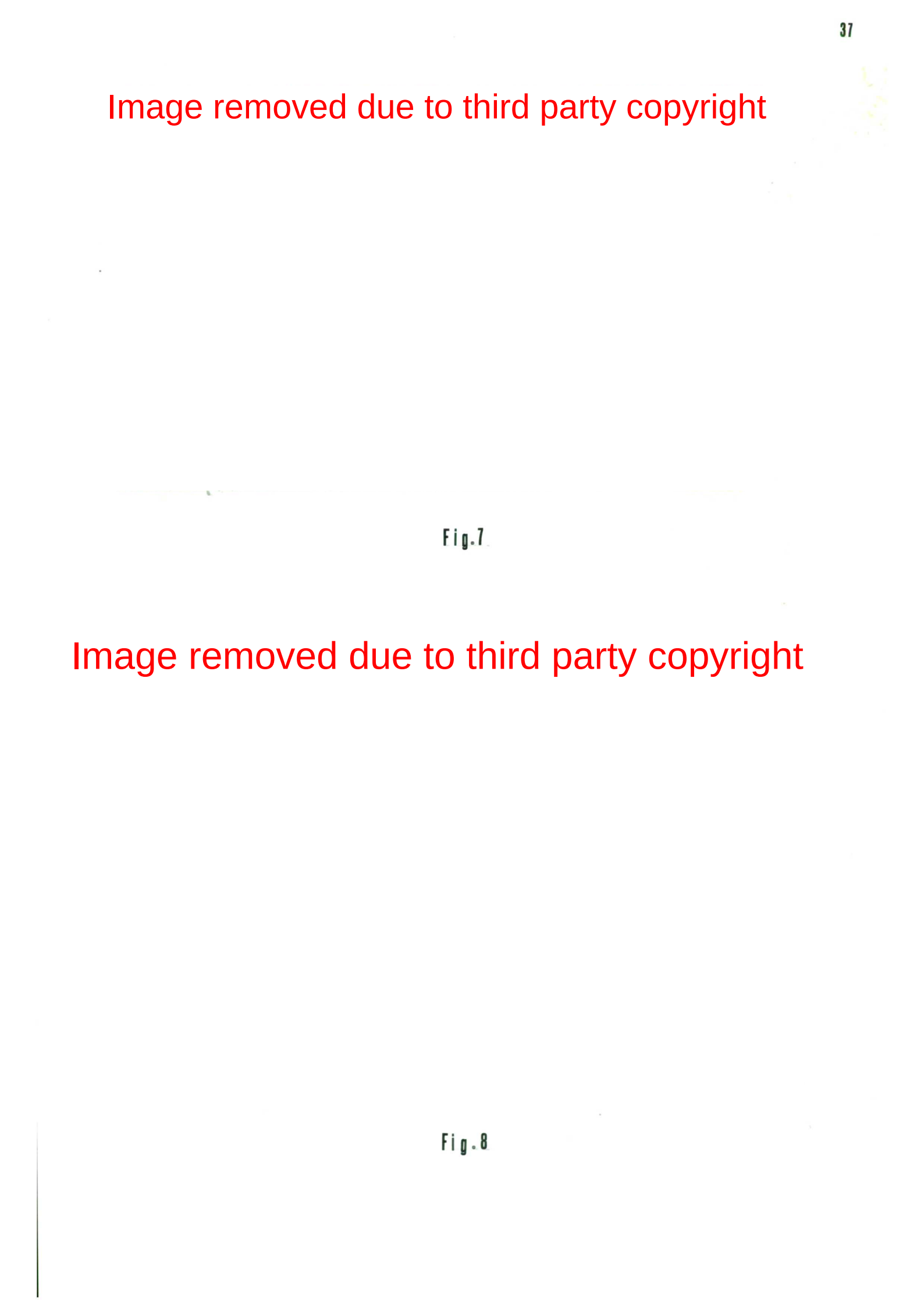
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Fig 9

Fig.10

Fig.11

Fig.12

Fig.13

Fig.14

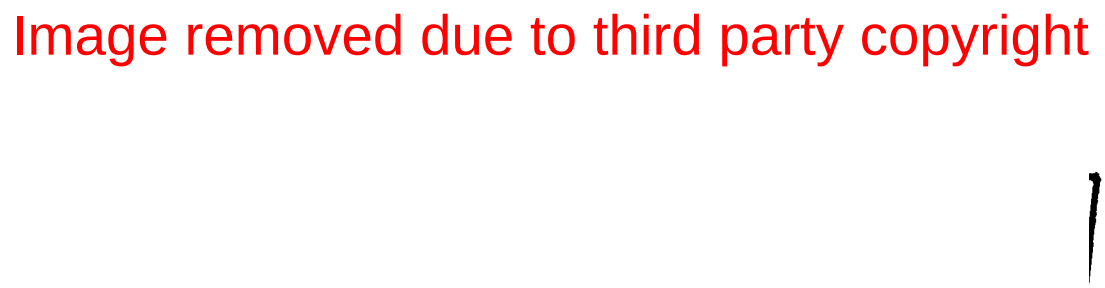
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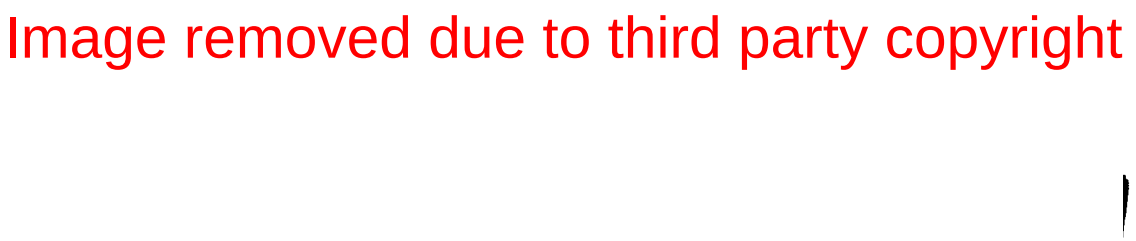
Fig. 15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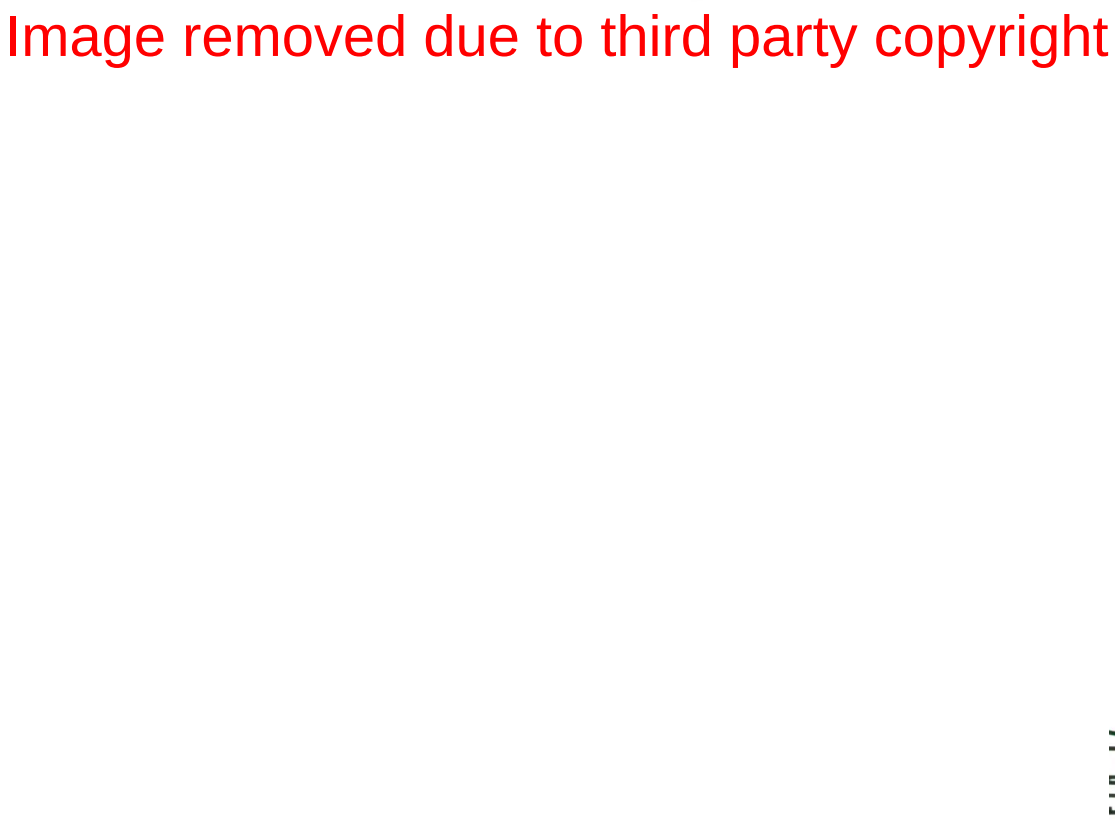

Fig. 11

Fig.18

Fig.19

Fig. 20

Fig 21

Fig. 22

Fig 23


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Fig.24


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Fig.25

Fig.26

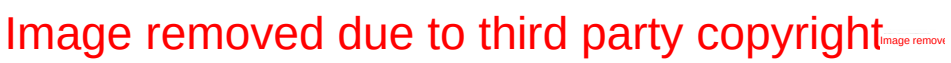

Fig.27

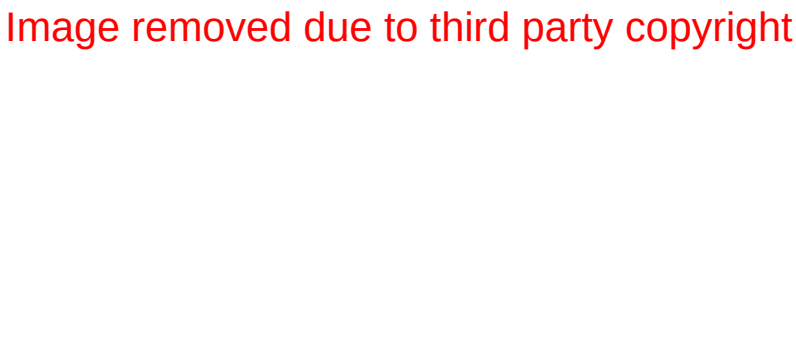
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Fig.28


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Fig.29

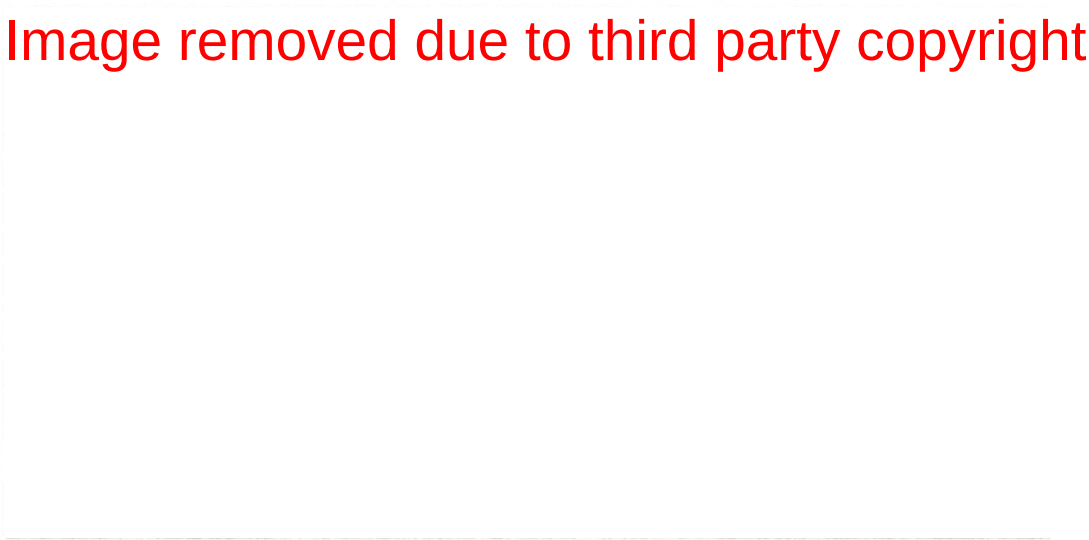

Fig.30

Fig.31

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Fig 39

Fig.40

Fig.41

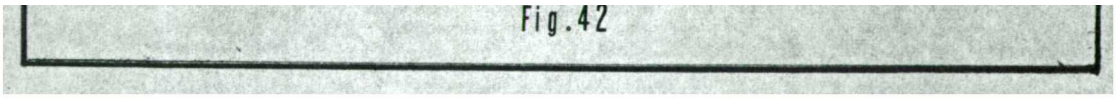

Fig.42

Fig.43

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Fig.45

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Fig.48

Fig.49

Fig.50

Fig.51

References and Notes for Chapter I (pages 6-39)

1. Flora I, Fig. 8.

2. Iraq Handbook, 167.

3. 200 mm rainfall is the theoretical minimum rainfall necessary for dry-farming but this often proves insufficient because it can be unreliable.

4. Oates D. Studies in the Ancient History of Northern Iraq. Fig. 1.

5. Flora I, Fig. 5.

6. Geographical Handbook, Naval Intelligence Division 1943. Syria, 85.

7. Ionides M. The Regime of the Euphrates and Tigris, 32, Table 14.

8. Dorrell P. 'Note of the Geomorphology of the country near Umm Dabaghiyah' Iraq XXXIV, 1972, 70.

9. Oates D. 'Excavations at Tell al Rimah 1971' Iraq XXXIV,1972, 77

10. Van Zeist W. 'Late Quarternary Vegetation History of West Iran' Review of Palaeobotany and Palynology 2, 1967. 301-11.

11. Butzer K.W. 'Climatic changes in arid regions since the Pliocene' in History of Land Use in the Arid Regions (ed. D. Stamp), 41-42.

12. ibid., 43.

13. Agrawal D.P. Reconstructing the Past Climates and Environment, 10-11.

14. Crown A.D. 'Toward a reconstruction of the Climate of Palestine 8000 BC to 0 BC.' JNES 31, 1972, 326-329.

15. Adams R.M. Land Behind Baghdad.

16. Adams R.M. Appendix V 'Settlement and Irrigation patterns in Ancient Akkad' in The City and Area of Kish (M.Gibson)

17. Adams R.M. & Nissen H. The Uruk Countryside

18. Oates D. 'Excavations at Tell Al Rimah' Iraq XXVII, 1965, 66.

19. Iraq XIV, 42, lines 78-81; Page S. 'A stela of Adad-nirari III and Nergal-ereš from Tell Al Rimah' Iraq XXX, 1968, 139, 142 and 152.

20. Van der Waerden B.L. 'On Babylonian Astronomy I: the Venus Tablets of Ammisaduqa' Ex Oriente Lux III, 1944-48, 41-42. c.f. Landsberger Jahreszeiten, 250-251. Landsberger finds that the large number of dated texts dealing with delivery of barley in the Ur III and Old Babylonian periods accord with those of the Neo-Babylonian period. However the delivery of dates in the Old Babylonian period was generally

carried out in Month VII while in the Neo-Babylonian period it took place in Months VII & VIII. He suggests that the date harvests in the Old Babylonian period were about three weeks earlier than in the Neo-Babylonian.

21. HSS XIV No. 215, lines 9, 11, 13-16. c.f. Lacheman E.R. Appendix D 'Epigraphic evidence of the material culture of the Nuzians' in Starr Nuzi Vol. I, 535 and CAD H. ḫaluli, 55.

22. Le Strange G. Lands of the Eastern Caliphate, 98-99.

23. Rowton M. 'Woodlands of Ancient Western Asia' JNES XXVI 1967, 268 & 274-277.

24. ibid., 268; CAD H Vol. 8, ḫašurrum (kind of cedar), 147; AHw. ḫašurrum, type of cypress, 335.

25. Mallowan M.E.L. 'Excavations at Tall Brak' Iraq IX, 13.

26. e.g. Gadd Stones Plate 20; British Museum, Assyrian Sculpture in the British Museum, Šalmaneser to Sennacherib Plates XXXI, LVI; Barnett R.D. Assyrian Palace Reliefs Plates 79, 117.

27. Barnett R.D. Assyrian Palace Reliefs Plate 105.

28. Rowton M. 'Woodlands of Ancient Western Asia' JNES XXVI 1967, 273.

29. Iraq Handbook has been used, together with Ionides M. The Regime of the Euphrates and Tigris, as the main source books for the geomorphology and geography of Iraq.

30. Lees Dr. G.M. and Falcon N.L. 'The Geographical History of the Mesopotamian Plains' Geographical Journal CXVIII, part 1, 1952, 24-39.

31. Gibson M. City and Area of Kish, 16 & 17.

32. Nützel W. 'Formation of the Arabian Gulf from 14000 BC' Sumer XXXI, 1975, 101-109. Note that Lees and Falcon (Geographical Journal CXVIII, 39) also stress changes in the extent of the Gulf due to alterations in sea-level.

33. Iraq Handbook, 67.

34. Le Strange G. The Lands of the Eastern Caliphate, 26.

35. Iraq Handbook, 72.

36. Uruk Countryside, 4.

37. ibid., 4.

38. ibid., 1.

39. Iraq Handbook, 38.

40. Buringh Soils, 186.

41. Iraq Handbook, 35.

42. See the reconstructions by Gibson (City and Area of Kish, Fig. 69) and Adams (Appendix V, City and Area of Kish, Fig. 68) which differ slightly in the number and alignment of channels in the Sippar to Nippur area.

43. Jacobsen T. 'Waters of Ur' Iraq XXII, 179.

44. Uruk Countryside, 35-39, Fig. 17.

45. Jacobsen T. 'A Survey of the Girsu (Telloh) Region' Sumer XXV, 1969, 105.

46. Jacobsen T. 'Waters of Ur' Iraq XXII, 179.

47. ibid., 183.

48. Safar F. 'Soundings at Tell al-Laham' Sumer V, 1949, 154.

49. Oates D. 'Euphrates History', Encyclopaedia Britannica Vol. 8, 826-27.

50. Adams Diyala, 3.

51. Iraq Handbook, 49.

52. Oates D. 'Tigris History' Encyclopaedia Britannia, Vol. 21, 1146.

53. Buringh Soils, 183; Iraq Handbook, 242; Le Strange G. The Lands of the Eastern Caliphate 39-40.

54. Jacobsen T. 'A Survey of the Girsu (Telloh) Region', Sumer XXV, 1969, 104.

55. Ionides M. The Regime of the Euphrates and Tigris, 176.

56. Adams Diyala, 11.

57. ibid., Figs 2 & 3.

58. Jacobsen T. 'A Survey of the Girsu (Telloh) Region' Sumer XXV, 1969, 106.

59. Thureau-Dangin F. Les Inscriptions de Sumer et d'Akkad 66-68. (Entemena Cone iii 38-vi 10)

60. Oates D. 'Euphrates History' Encyclopaedia Britannica Vol. 8, 826-27.

61. Buringh Soils, 184 & Fig. 94.

62. Mallowan M.E.L. 'Development of Cities' Cambridge Ancient History, Fascicle 58, part 1, 29ff.

63. Lambert W & Millard A.R. Atra-Hasis: the Babylonian Story of the Flood, 5 & 14.

64. Gragg G. 'The Fable of the Heron and the Turtle' AfO 25, 1973, 70-71.

65. Adams Diyala, 48.

66. Wiseman D.'Assyria and Babylonia 1200-1000' Cambridge Ancient History, Fascicle 41, 31.

67. British Museum Assyrian Scultures in the British Museum Plates XLIX-LII.

68. Luckenbill D.D. Annals of Sennacherib, 34, line 53; Brinkman J. History of the post-Kassite period, 178, note 1093

69. Luckenbill D.D. Annals of Sennacherib , 36, lines 67-68.

70. Buringh Soils, 218-221.

71. ibid., 225-242.

72. ibid., 37-38.

73. Davies D. Hywel. 'Obervations on Land Use in Iraq' Economic Geography 33, 1957, 156, 124.

74. Buringh Soils, 210.

75. ibid., 115.

76. Flora I, 10-11.

77. Buringh Soils, 143.

78. ibid., 145, Fig. 65.

79. ibid., 146, Fig. 66.

80. ibid., 151-156.

81. see Gibson M. City and Area of Kish

82. see Uruk Countryside.

83. Buringh Soils, 154.

84. ibid., 155-56.

85. Gibson M. City and Area of Kish, 31.

86. Adams Diyala, 9; Gibson M. City and Area of Kish, 31.

87. Buringh Soils, 153.

88. Gibson M. City and Area of Kish, 44 No. 117 - he remarks that the effect of the wind on tells must be similar to the effect it has on rock formation in the desert.

89. Flora I, 9-10.

90. Yahia H.M. Soils and soil conditions in the Sediments of the Ramadi Province, 119 quoting the U.S.Salinity Laboratory Staff, glossary 1954.

91. Buringh Soils, 83-84, 91-92.

92. Yahia H.M. Soils and soil conditions.., 120.

93. ibid., 85.

94. ibid., 133-135, quoting J.C. Russel's lecture notes on general soils for Iraqi Students (College of Agriculture, University of Baghdad).

95. ibid., 135, quoting A.Afar 'Reclamation of Saline Soils in Iraq' (in Arabic).

96. Harden A. 'Archaeological methods for dating of soil salinity in the Mesopotamian plain ' Paper from the Symposium on the Age of Parent Material and Soils, Paleopedology (ed. D.G.Yaalon) 1971., 183.

97. ibid., 185, Table 1; dates given for the sites tested were:

Kish	3200-3000
Nippur	4500-3800
Warka	" "
Ur	" "
Tel es-Sawwan	6000-5000
Tel Harmal	2400-2000
Aqar Quf	1600- 911
Tello	4500-3800

No details are given of the buildings from which the bricks were selected so that it is difficult to comment on the accuracy of the dates. Those given for Nippur, Ur and Tello in particular would seem to be rather early.

98. ibid., 186.

99. Yahia, H.M. Soils and soil conditions.., 133.

100. Buringh Soils, 170.

101. These soils contain salts of deliquescent calcium and magnesium chloride and are not related to any alkaline soil. A characteristic of these soils is that they remain moist even in the hot dry summers of Iraq.
Buringh Soils, 92 & 89.

102. Fernea R. Shaykh and Effendi, 148-149.

103. Figures for all the crops and livestock in this section (unless otherwise states) are taken from the Results of Agricultural and Livestock Census in Iraq for the year 1958/59 published by the Ministry of Planning, Central Bureau of Statistics, Baghdad 1961. Here the figures are from the old liwa of Mosul which covered from the Sinjar across the Tigris to the Greater Zab into the mountains to the Turkish and Iran border, and south to the Little Zab.

104. Iraq Handbook 463.

105. Buringh Soils, 224.

106. Iraq Handbook, 541-542.

107. Davies D. Hywel 'Observations on Land Use in Iraq' Economic Geography, 33, 1957, 123, Fig. 1.

108. Buringh Soils, 211.

109. Warriner D. Land and Poverty in the Middle East, 97.

110. Geographical Handbook Syria, 264.

111. Davies D. Hywel 'Observations on Land Use in Iraq' Economic Geography 33, 1957, 123, Fig.1.

112. Musil A. Middle Euphrates, 1-29, 73-82.

113. Adams Diyala, 13-14 and Table 3.

114. Iraq Handbook, 467.

115. Davies D. Hywel. 'Observations....' Economic Geography 33,1957,12

116. ibid., 130.

117. Poyck A.P.G. Farm Studies in Iraq, 38-42.

118. Yahia H.M. Soils and soil conditions..., 164.

119. Davies D.Hywel 'Observations...' Economic Geography 33,

120. Fernea R. Shaykh and Effendi, 38.

121. Poyck A.P.G. Farm Studies..., 39.

122. Fernea R. Shaykh and Effendi, 39.

123. Salim S. Marsh Dwellers of the Euphrates Delta, 90-91.

124. ibid., 84-88.

125. Dowson V. Dates and Date Cultivation of the 'Iraq, 9-15.

References and Notes for Chapter II (pages 40-104)

1. Flora IX, 244.

2. Renfrew J. Palaeoethnobotany,68.

3. Barley remains have been found on many archaeological sites. The following are examples dating from 3000BC on.

Ur: Broken grains of six-row barley were recovered, with other grains, from 2 graves, PG/208 and PG/296, at the Royal Cemetery (mid-third millennium). 92 complete grains of hulled barley were found near some papsukkal figures in a building probably dating to the time of the governorship of Ur by Sin-balatsu-iqbim in the mid-first millennium. The measurements obtained from these grains show that the first millennium barley was larger than the third millennium material. (R.Ellison, J. Renfrew, D.Brothwell and N. Seeley 'Some food offerings from Ur...' Journal of Archaeology Science, 1978, in press)

A study of ceramic material provided imprints of barley from the 'Ubaid period to Isin/Larsa. (Helbaek H. 'Ecological effects of Irrigation' Iraq XXII, 1960, 94-95)

Tell Chragh (Shahrzor Valley): A sample of carbonized material mainly consisting of hulled two-row barley, probably H. distichum, dated to the Later Ubaid/early Uruk perid. The average length of the grains was 6.22 mm. (Helbaek H. 'Ancient Crops in Shahrzor Valley in Iraqi Kurdistan' Sumer XVI, 1960, 79-80)

Kish: 2 samples of grain were found 'one metre below the "Red earth stratum" and 3 metres northeast of the "witness" or portion of Monument "Z" temporarily left standing by Mr. Watelin'. These, (together with a sample from Jemdet Nasr) were sent for identification. The grain was found to contain seeds of six-row hulled barley - no kernels could be identified as 'hull-less' or two-row. (Field H. 'Ancient Wheat and barley from Kish' American Anthropology, 34, No.2. April/June, 1932, 307) The description given of the find-spot of the barley samples suggestion that they date to the late Early Dynastic II. (Gibson M. City and Area of Kish, Reconstructed section, Fig. 61)

Khafajeh: Barley (identified as H. vulgare) was found in House D, K.43:5, Temple Oval, mid-third millennium. (Delougaz P. Temple Oval at Khafajeh, 154.)

Tell Brak: Grain from this site was examined by Professor J. Percival of Reading and identified as H.vulgare (H.hexastichon) The material came from Naram-Sin's Palace (Rooms 10, 13 & 16) dating to the Agade period and from the HH area which continued until c.1500-1300 BC. (Mallowan M.E.L. 'Excavations at Brak and Chagar Bazar' Iraq IX, 1947, 12)

Tell Taya: Barley remains (H. vulgare) were found in Akkadian and early second millennium levels. In the Akkadian levels barley (together with wheat grains, Lathyrus sativus, Lens esculenta and Pisum sativum) were found in ovens. (J.Giles Waines, Appendix 6 'Plant Remins from Tell Taya, Iraq' in 'Tell Taya (1972-3): a summary report' (J.E.Reade) Iraq XXXV, 1973, 185-87.

Nippur: Carbonized barley (species not specified) was found in TB Level IV, House H, Room 214, on the lowest floor level, to the north and east of the hearth, under a heavy layer of black ash and debris. This level can be dated to the late Ur III period. (McCown D and Haines R. Nippur I, Temple of Enlil, Scribal Quarters and Soundings, 52.

A reference to four-row barley being found at Nippur occurs in Field's article on Kish (Field H. 'Ancient wheat and barley from Kish' American Anthropology 34, No. 2 April/June, 1932, 308) This type of barley is a variant of six-row barley (H. vulgare) (Flora IX, 254.)

Bazmosian: Two-row hulled barley (H. distichum) (average length 6.65 mm) was found in samples from Isin/Larsa and Hurrian levels. (Helbaek H. 'Isin Larsan and Horian Food Remains at Tell Bazmosian in the Dokan Valley' Sumer XIX, 1963, 27-30.)

Nuzi: An impression was found in the bitumen lining of a large pot in the GA.SUR level (Agade), Pavement IV. (Starr Nuzi I, 22). Carbonized grain was found in large heaps on the floors and sometimes in storage pots, for example it was found in C.49-D.11, associated with fragments of large jars and in the Palace L.22 in storage jars. (Starr Nuzi, 198, & 148)
The specialists who examined this material could not always say what type of grain was found but barley was positively identified in many cases, e.g. L.22, so that 'it seems probable that all of the samples were the same'. (Starr Nuzi, 493.)

Nimrud: Hulled 6-row barley and hulled two-row barley occur in samples dating to the 7th century BC. In Sample VII (TW53, Room 19) the average length is 6.15 mm - about the average for carbonized ancient barley from the Near East. Most was two-row, but a very small proportion was the nodding six-row variety Bere (Sample date c.666-626). A complete cast of a fresh spike of two-row hulled barley was found in the well in NN, dated to between 705 and 640 BC (Sample III). Sample IV (TW 53, Room 9) in the large storage jar, is irregular in grain size; the average is 5.6 mm but many grains do not reach 4 mm. Most of these grains are two-row, a few are Bere. (Helbaek H. Appendix 6, in Mallowan Nimrud II, 613.)

Assur: Barley was found in the Anu-Adad Temple, dated to the late Assyrian period. (MDOG No. 28, 1905, 18)

4. Flora IX, 194-208.

5. Braidwood R.J. and How B. Prehistoric Investigations in Iraqi Kurdistan, 103.

6. Renfrew J. Palaeoenthnobotany, 47.

Wheat remains have been found on many archaeological sites. The following are examples from 3000 BC on.

Ur: Some broken wheat grains and fragments of wheat glumes were found in grave PG/208 in the Royal Cemetery (mid-third millennium). They were found together with barley grains, some pea seeds, and seed pods of Medicago sp., a common weed. The wheat appears to be a free-threshing type but the fragmented condition of the material has made a more specific identification impossible. It is thought that the sample may be the remains of crop-processing, although how this got in a grave is unclear. (R.Ellison et al. 'Some food offerings from Ur...' Journal of Archaeological Science in press)

Emmer imprints were found in pottery dating from the Ubaid period. (Helbaek H. 'Ecological effects of Irrigation' Iraq XXII, 1960, 194-195.)

Tell Taya: Grains of Triticum aestivum were found in Early Dynastic, Akkadian and early second millennium levels. T. dicoccum was found in Akkadian and early second millennium levels. Small amounts of T. dicoccum and T. aestivum were found with larger amounts of barley and a few seeds of grass pea, lentils, and field pea, in ovens in the Akkadian levels. (Waines J.Giles, Appendix 6, 'Plant remains from Tell Taya, Iraq' in 'Tell Taya (1972-3): a summary report' (J.E.Reade) Iraq XXXV, 1973, 185-187.)

Tell Chragh (Shahrzor) 1 grain of T. dicoccum was identified (length estimated at 6.65 mm), dating to the late Ubaid/early Uruk. (Helbaek H. 'Ancient Crops in the Shahrzor Valley' Sumer XVI, 1960, 79-80)

Jemdet Nasr: An imprint of a grain of T. vulgare was found on a pottery lid, and dated to c.3000 BC. (Helbaek H. 'Isin Larsan and Horian remains at Tell Bazmosian' Sumer XIX, 1963, 31.)

Field, during excavations at Jemdet Nasr, found some grains in a painted pottery jar. The jar was described as Type Susa II and this type of jar was found in association with 'pictographic tablets in linear script'. This suggests a date in the late fourth millennium. The grain was identified as a species of wheat: Professor Percival of Reading considered it to be T. turgidum, the Botanical Department of the Field Museum determined it as T. vulgare or T. compactum and Dr. Stapf of the Botanical Magazine, Kew, identified it was T. compactum. (Field H. 'Ancient Wheat and Barley from Kish' American Antbropology, 34, No. 2 April/June, 1932, 304-305.)

Tell Brak: T. dicoccum and possibly some T. compactum or T. turgidum were found in rooms 10, 13 & 16, of Naram-Sin's palace, dating to the late Agade period. (Mallowan M.E.L. 'Excavations at Tell Brak' Iraq IX, 1947, 12.)

Tell Qurtas (Shahrzor): Some 35 fragments of wheat were found: most of the identifiable fragments were emmer but there was one grain of Club or Bread wheat. These date to Ur III/Isin-Larsa. (No barley was found in this sample.) (Helbaek H. 'Ancient crops in the Shahrzor Valley' Sumer XVI, 1960, 80-81)

Tell Harmal: A small amount of carbonized grain was found in the Isin/Larsa levels. The remains were mainly emmer although 1 or 3 grains of einkorn were identified. (Helbaek H. 'Isin Larsan and Horian remains at Tell Bazmosian' Sumer XIX, 1963, 35.)

Ishchali: 10% of grain imprints on pottery found here were emmer wheat, dating to Isin/Larsa levels. (Helbaek H. 'Ecological effects of irrigation' Iraq XXII, 1960, 195)

Khafajeh: Emmer wheat imprints, on pottery, made up 40% of the grain imprints dating to the Old Babylonian levels. (Helbaek H. 'Ecological effects of irrigation' Iraq XXII, 1960, 195.

Bazmosian: Both T. dicoccum and T. vulgare were found at this site. In the Isin/Larsa levels the emmer wheat varied in length from 5.67 mm to 6.59 mm and the bread wheat from 4.21 mm to 5.67 mm. Helbaek's frequency chart suggests slightly more bread wheat than emmer wheat. In the Hurrian levels the emmer wheat was 4.95 mm to 7.14 mm long and the bread wheat was 3.84 mm to 5.49 mm long. (Helbaek H. 'Isin Larsan and Horian remains at Tell Bazmosian' Sumer XIX, 1963, 27-29.)

Nimrud: Most of the wheat in the citadel appears to be bread wheat. A few grains and spikelet fragments can be identified as emmer wheat. In the samples from Fort Shalmaneser (Nos. XIV-XII, N-S corridor S40 C7) were bread wheat and No. XV was a mixture of bread wheat and emmer wheat. The average length of the bread wheat in sample XII is 4.93 mm. All these samples date to the 7th century BC. (Helbaek H. Appendix 6 in Mallowan Nimrud, 614-615.)

7. DAB 87.

8. CAD Vol. 8, K. kunāšu: emmer, 536-538.

9. CAD Vol. 8, K. kibtu: wheat, 340-341.

10. Hrozny Getreide e.g. 173 & 54.

11. ibid. 55 & 18.

12. Bauer No. 17.

13. Hrozny Getreide, 75.

14. ibid., 73-75.

15. Helbaek H. Appendix 6 in Mallowan Nimrud, 615.

16. MDOG No. 31, 1906, 10.

17. CAD Vol. 3, D. duḫnu millet, 171.

18. PBS 2/2 No. 102, line 3.
ASSOR 16, No. 1, 13-14 & 65-67.

19. DAB 106.

20. CAD Vol. i, K. kurangu, 556.

21. AfO 18, 328, line 23.

22. Postgate Archive, 205, No. 207, line 11.

23. Flora IX, 48.

24. Adams Diyala, 16, Table 5; But note Iraq Handbook, 456, which gives February-April as sowing months and July-September for harvest.

25. Diyala Report, 25, Appendix 5 (HSS X No. 30, 31, 33, 34 & 36) Averages calculated from the combined fields and not from the average of the percentage of each field as done in this appendix.

26. Diyala Report, 34-53.

27. Sheffer C. Agronomy for the anthropologist, unpublished preliminary Doctoral thesis, 41, Table IX.

28. Pellet P.L. & Shadarevian S. Food Composition, Section 1 Nos. 1 & 7.

29. Ministry of Planning, Department of Agricultural Statistics, Estimates of Net area, average yield and production of wheat and barley in Iraq, 1969: 1970, Table VIII.
It must be noted that the sowing dates of these fields are not given so that the actual growing season involved can not be calculated. The number of selected fields under wheat are 4001 and 3051 under barley.

30. Ministry of Planning: Results of the agricultural and livestock census in Iraq for the year 1958/59, Table 9 in each liwa section.

31. Flora I, Fig. 5

32. Iraq Handbook, 24-26.

33. Adams Diyala, 16, Table 5.

34. Ministry of Planning, Estimates of net area..., Table VIII

35. Dowson V. Dates and Date cultivation of the 'Iraq, 20 - 23

36. Parrot Sumer No. 231.

37. Layard II, Plate 15; see discussion in Laessøe J. 'Reflexions on modern and ancient oriental water-works' JCS VII, 1953, 17-22.

38. Laeossøe J. 'Reflexions on modern and ancient oriental waterworks' JCS VII, 1953, 13-14.

39. Kupper J. 'Lettre de Kish' RA LIII, 1959, 37, D33, 3.

40. Laessøe J. JCS VII, 1953, 14 (Gautier J.E. Archives d'une famille de Dilbat...tempes de la Première Dynastie de Babylon, No. v, 29ff. (1908)).

41. Laessøe J. JCS VII, 1953, 22-26.

42. ARMT vi Nos. 5-9 for example.

43. e.g. Ungnad 'Datenlisten' RlA, 134: Gudea e:'The year the Canal Ningirsu-ušumgal was dug'; 149, Ur-lukiuga, of the Dynasty of Isin: 'The Year he dug the Canal Imgar-Nininsina'.

44. e.g. Thureau-Dangin F. Inscriptions de Sumer et d'Akkad, 74, Cone A.; Luckenbill D.D. Ancient Records of Assyria and Babylonia I, 60, para. 173.

45. see Adams Diyala.

46. Adams R.M. Appendix V 'Settlement and Irrigation patterns in Ancient Akkad', 182-208 in The City and Area of Kish (M. Gibson). (The completed survey of the area, is, I understand, now under study.)

47. see Uruk Countryside.

48. Gibson M. The City and Area of Kish

49. Jacobsen T. 'A survey of the Girsu (Telloh) Region' Sumer XXV, 1969, 103-109.

50. Adams Diyala, 121.

51. ibid. 50-55.

52. ibid., Fig 2 and the Catalogue.

53. The split between Agade to Ur III and Isin/Larsa may be slightly misleading owing to the problems in precise pottery dating in these periods. Adams and Nissen (Uruk Countryside) have preferred to lump Agade to Old Babylonian together on their distribution map (Fig. 17) only indicating by identifying letters, the dates of settlements.

54. Jacobsen T. 'A survey of the Girsu (Telloh) Region' Sumer XXV, 104.

55. Fernea R. Shaykh and Effendi, 148-149. There was an increase in salinization over twenty years in the Daghara region, probably because of the increase in water supply which meant that ditches and canals could hold water all year round.

56. ibid., 159-162.

57. Sauren H. Topographie der Provinze Umma...der III Dynastie von Ur part 1, 1966, 29.

58. e.g. Sauren H. Topographie der Provinze Umma...

59. Bauer No. 3

60. ibid., 69, kùš = c.50 cm in length.

61. Bauer No. 2, i 1-3.

62. Bauer No. 1

63. Sauren H. Topographie der Provinze Umma... , 40-65.

64. Eames Coll. G 26 and I 35.

65. A SAR is approx. 36 sq. m. 60 GÍN = 1 SAR so 7.5 GÍN is c. 4.5 sq.m.

66. Eames Coll. W. 81

67. These divisions into third, second and first millennium are not precise but have been used to give some sort of chronological framework on which to consider changes in irrigation. Settlement and irrigation patterns overlap these aribitary boundaries.

68. Harris R. 'Archive of Sin Temple in Khafajeh' JCS IX, 1955, 47 (No. 11).

69. Simmons S. 'Early Old Babylonian Tablets' JCS XIII, 1959, 81.

70. Ungnad A. 'Datenlisten' RlA, 2, 181, para.140.

71. Adams Diyala, 34.

72. Uruk Countryside, 37. Adams has advised caution in dealing with gross numbers of sites which are occupied in any one period because of the possibility of certain index-fossils being continued from one historical period into another thereby obscuring changes in settlement patterns but his impression is that the number of occupied sites fell away during the Old Babylonian period.

73. Gibson M. City and Area of Kish, 50.

74. Uruk Countryside, 39-41, and Fig. 18.

75. Diyala Report, 7 (e)

76. Ungnad A 'Datenlisten' RlA, 156-157, Nos. 122 & 126, 158 No.150.

77. Walters S. Waters for Larsa, Yale University Press, 1970.

78. e.g., ibid. the Etellum canal, No. 3; No. 14; the Isin Canal project: No. 102, 103.

79. ibid., 14.

80. ibid., No. 30; see also Rowton M. 'Water courses and water rights in the official correspondence from Larsa and Isin' JCS XXI, 1967, 267-274, for discussion on state involvement with irrigation.

81. King L.W. Letters of Hammurabi, III, 14 No.V, II No. 71.

82. ibid., 16 No. VIX, I No. 5.

83. ibid., 18 No. VII, I No. 4. This text is damaged. line 10) mi-iq-ti-ša u-su-uḫ/ ḫa-mi-ša šu-ut-bi/ šu-te-še-u-ir-š miqtu and ḫāmū are probably reeds and waterplants which are to be removed. Ḫāmū: CAD Vol. 6, 73; miqtu: AHw, 657.

84. ibid., 188 No. VII, II No. 95.

85. ARMT III, 112.

86. Ionides M. The Regime of the Euphrates and Tigris, 39.

87. ARMT III No. 1

88. ARMT III, No. 79, obv.7 - rev.2'

89. ARMT III No. 4, lines 6-8

90. ARMT III, No. 2 and ARMT VI No. 8

91. ARMT VI No. 2.

92. ARMT VI No. 3.

93. ARMT III No. 77.

94. ARMT III No. 5.

95. ARMT III No. 5, lines 48-50; No. 79, lines 4'-7'.

96. ARMT VI No. 7, line 9.

97. ARMT VI No. 6.

98. ARMT VI No. 9 & No. 4.

100. ARMT VI No. 1, line 12.

101. ARMT VI No. 5, line 5.

102. ARMT III No.9, line 6.

103. ARMT III No. 75, line 5.

104. Adams Diyala, 58-59, and Table 16.

105. Gibson M. City and Area of Kish, 159.

106. Uruk Countryside, 55-57, and Fig. 19.

107. Luckenbill D. D. Annals of Sennacherib, 52-53, lines 36-49.

108. Most of the following details are from J.C.Russel Tillage Practices in Iraq, 4, 13 following, written in 1957 for use in class.

109. Ministry of Planning: Estimates of Net Area... , harvest dates Table VIII.

110. Lambert RA 59, 125 No. 51.

111. Landsberger Jahrezeiten, 278 ff.

112. Kramer S.N. The Sumerians, 340-42; Salonen Agricultura, 202-212; Diyala report, 55-58.
Lines 5-12.

113. Amiet P. Glyptique Susienne No. 621, Plates 14 & 78. It is possible however that these may be used instead of ploughs for the breaking of the ground before soaking.

114. Farmers Almanac lines 13-29.

115. UET VI, 6 and Plate LI, Nos. 42-43. Text found in domestic quarters apparently copied by scribes and kept in ordinary houses. (?Kassite)

116. Kramer F.L. Breaking Ground,76.

117. Watelin L. Ch. & Langdon S. Excavations at Kish Vol. IV, Palte XXXIII, 3.

118. Parrot A. 'Les Fouilles de Mari' Syria, 32, 1955, 195, Plate XVII, 1.

119. Kramer F.L. Breaking Ground, Fig. 35a.

120. ibid. Fig. 3.

121. ANEP No. 91

122. Moorey P.R.S., 'Loftus Hoard of Old Babylonian Tools from Tell Sifr' Iraq XXXIII, 1971, 68-72.

123. McCown D & Haines R. Nippur I, Temple of Enlil and Scribal quarters..., Plate 154, No. 23.

124. Moorey P.R.S. Iraq XXXIII, 1971, 68-70.

125. White K.D. Agricultural Implements of the Roman World, 126-127.

126. See Salonen Agricultura, 40-70, for a full discussion on words for ploughs.

127. Place V. Nineveh et l'Assyrie Vol. 1. 86-88, Vol. 3, Plate 71.

128. Salonen Agricultura Plate 3, 1.

129. Šach F. 'Proposal for the classification of pre-industrial tilling implements' Tools and Tillage I/1, 1968, 10.

130. Cylinder Seals, Plate XIj.

131. Parrot Sumer No. 234.

132. Cylinder Seals Plate XXIV e.

133. Salonen Agricultura Plate VIII 1.

134. Cylinder Seals Plate XXXVII g.

135. Early Dynastic III: Porada I, Plate XX No. 126e.
Agade: Cylinder Seals Plate XIX e & f.

136. Cylinder Seals Plate XX d.

137. Salonen Agricultura Plate V, 1 & 2, and Plate VI, 1 & 2.

138. ANEP No. 520.

139. Loud G. Khorsabad I, 94-96 and Fig. 104.

140. ANEP No. 88.

141. Note that Russel believes that the plough is an artist's impression and unworkable. (See below Vol.1, p.84, Note 206)

142. Farmers Almanac lines 30-40.

143. Civil M. 'Song of the Plowing Oxen', 89, lines 120-121, A.O.A.T. 25. The harrow appears to be a drag fitted with teeth.

144. Eames Coll. E. 20, but note that Salonen Agricultura, 164, gives TUK.ŠE.KIN as a variant of ŠE.KIN/niggallu, sickle.

145. SLB 1/2 (Larsa), 66-71, Nos. 45 & 46.

146. Goetze A. 'Fifty Old Babylonian letters from Harmel' Sumer XIV, 1958, no No. 17, lines 16-22. zarzaru (zanzarni) is a vegetable. CAD Vol.21, Z. 73- 74.
It is not clear whether it is required for planting in the fields. The amounts involved are carefully specified.

147. Driver and Miles The Babylonian Laws, 26-27.
CH 43 & 44.
In No. 44 it is possible that the use of the verb marāru may mean digging with a spade to b reak up the soil. (Salonen Agricultura, 447).

148. Salonen Agricultura, 65-70.

149. Farmers Almanac lines 41-63.

150. Bauer No. 9 i 1- ii 1, iii 3 - iv 2.

151. Bauer No. 9 iv 2.

152. TCS I No. 109

153. SLB 1/2 (Larsa) No. 46.

154. Farmers Almanac lines 42-47; 1 NINDAN = c6 m. 1 GAN = c.36 sq.m.

155. Pettinato G & Waetzoldt H. 'Saatgut und Furchenabstand beim Getreideanbau' Studia Orientalia XLVI, 1976, 273, Table 1.

156. ibid. Table 2a.

157. Maekawa K. 'Agricultural production in Ancient Sumer' Zinban No. 13, 1974, based on the Nippur text (BE III No. 92) . This equation does not work out exactly through this text especially see Table 1a, c in Pettinato-Waetzoldt, 273.

158. Farmers Almanac lines 64-72.

159. Adams Diyala, 14.

160. Driver and Miles The Babylonian Laws, 30-31, CH 57 & 58.

161. Farmers Almanac lines 73-93.

162. Examples of sickles found on excavated sites:

Clay sickles have been found on many sites and were once thought to be a dating indicator for the Ubaid (e.g. Uqair: Lloyd S. 'Tell Uqair' JNES II, 1943, Plate XXVIII B). Recent work suggests they were in use in the Uruk period as well. (Smith P.E.L. & Young T.Cuyler 'Greater Mesopotamia, a trial model' In Population Growth (ed.B.Spooner), 46.)

Kish: A thin blade, c.1.55 mm thick, the lower half of which is broken was found lying in debris near a group of graves in the 'A' Cemetery. One edge of the blade is roughly serrated and it could have been part of a saw or a sickle. (Mackey E. 'Report on the excavations of the 'A' Cemetery at Kish, Plate XVIII No. 16). The blade probably came from a disturbed grave, dated to c.2400-2300 B.C. (Moorey P.R.S. 'Cemetery A at Kish, grave groups and chronology' Iraq XXXII, 1970, 104)

Approximately 4 serrated flint blades, c.3 cm long, were found on or just below the surface of the Palace mound. Some of the bitumen by which they were fastened in position still existed on No. 917 and 1391. Impressions found on this bitumen suggests these blades could have been fastened to a pottery tool - possibly a pottery sickle. The position of these blades above the Palace and the graves could suggest an Agade/Ur III date but it is impossible to give a precise date and they could have been earlier or later. (Mackey E. 'A Sumerian Palace and the 'A' Cemetery at Kish, 205 and Plate XLII)

Nippur: In SGIV flint teeth set in bitumen and adhering to a wooden handle were found. The curved shape of the object and the fact that there is only one cutting edge suggests it was used as a sickle. Early Dynastic. (McCown D and Haines R. Nippur I...., Plate 163, No. 13)

Flint blades with saw-teeth on one or both edges, and sometimes with a silica polish were found in Levels TB IV-I (Ur III-Isin/Larsa, ibid., Plate 154, No. 2 & 1) and TA X (Old Babylonian, ibid., and II (Neo-Babylonian, ibid., 102-103) which suggests that this type of tool - flint teeth set in wood, was in use throughout the period, probably used as a sickle.

Bronze blade, one profile crescent shaped and tapering to a narrow end; the other profile slightly concave, the other end thickened. The narrowed end could have been inserted in a wooden handle and lashed in place. The slightly concave profile would be the cutting edge. (TB IV, locus 216; 2N 462, Length 18 cm., ibid., Plate 154, No. 2, Ur III)

A similar blade was found (dated c. Isin/Larsa Period) The outer side of the tool has a fuller curve. It has not got the traditional crescent curve of a sickle but could have been used in harvesting. It was found in TBII, House D, Room 142: 2N 379; its presence inside a house does not mean it could not have been used for agricultural purposes but its shape suggests it could also be used as a chopper of some sort. (16 cm long) (ibid., Plate 154, 1)

A curved single-edged blade of iron was found in TA Level III/1, Room 58. The blade was was probably hafted by inserting into a handle and tied. (15 cm long) (ibid. Plate 155, No.3, Neo-Assyrian)

Tello: A possible sickle, with three rivets, was found in the Maison des Fruits (probably Early Dynastic, de Genouillac Fouilles de Telloh I, 89, Plate 71, 2)

Aššur: A copper sickle was found in the old Ištar-Temple, north-east of the long passge to the North-West tower, against the North-West wall high in Level G floor. The tool has a small rib on the back. The cutting edge is smooth and it has a short tang for fastening to a handle. (Andre W. Die Archaischen Ischtar Tempel in Assur, 83, No. 118, Fig. 63)

Another blade which has a little curve (also copper) was found high in Level E, above the Level E cult room. The blade is 34 cm. long but the actual cutting edge - which is on the outside edge - is 24 cm long. (Ur III, ibid., 108, No. 158, Fig. 82)

Warka: A probable sickle blade (W.19833a) was found in DdXIV2, 3, Room 6 of Sinkašid's palace, in a robber's hole over a tomb. It was found with an arrowhead and was in fragments. It is said to be of bronze and is 16 cm long and 5.3 cm at its greatest width. (Similar fragments were found in DdXIV 2, Room 6 in the rubbish near the door from Court 28, (W.20037a)). This sickle blade is an unusual shape; it is narrow at the hafting end but swells out on one side to a depth of 5.3 cm. The other side is very slightly concave. One end is missing. The blade is wider than usual in sickles and it may actually have been used to cut other substances than grain, e.g. reeds. (probably Isin/Larsa, UVB XVIII, 37, Plate 17 H)

Nuzi: Copper sickle blades were common and found in the Palace, temple and in private houses. The most common type is banana-shaped with a tang at one end for hafting, and narrowing into a very small tang or knob at the other. A cache below G.54, Temple E, contained several sickles: two had serrated edges, and one had a thicker blade. This last has a dedicatory inscription (The god-name U$_4$-za - possibly to be interpreted as the goddess Dilbat or Ishtar.) (early to mid-second millennium, Starr Nuzi II, Plate 124, C, D & E, and I, 471 & note 37.)

Nimrud: A crescentic iron blade (ND 6165) with a triangle section was found in Fort Shalmaneser, NW 15, together with a similar blade (ND 6166). ND 6165 is 26 cm long, its tang is missing. ND 6166 is 13 cm long. They are probably sickles. (Neo-Assyrian, Stronach D. 'Metal Objects from the 1957 excavations at Nimrud' Iraq XX, 1958, 175, Plate XXXV No. 8)

An iron sickle, ND 3360, was found in Room 19, of the Private houses and an iron blade, which may be an axe or a sickle, (ND 3631) was found in level 2, Room 42, length 15.8 cm. (Neo-Assyrian, Mallowan M.E.L. 'Excavations at Nimrud (Kalhu) 1953' Iraq XVI, 1954, 142 and 149.

Khorsabad: A curved iron blade was found in the Nabu temple forecourt, DS 591. In its illustration it appears to be broken, but one end narrows as if for a hafting-tang. It is probably a sickle. (Neo-Assyrian, Loud G and Altman C.H. Khorsabad II, Plate 62, No. 195.)

163. ANEP No. 91

164. TCS I, No. 173.

165. Salonen Agricultura, 423-426.

166. UET III Nos. 1346 and 1407.

167. SLB 1/3 (Lagaba), 38-43 Nos. 95, 96 & 97, p.61, No. 125.

168. Farmers A manac lines 84-108.

169. MAD 4 e.g. Nos. 48, 49, 66 & 97.

170. Helbaek H. 'Plant collecting, dry-farming and irrigation agriculture in prehistoric Deh Luran' Appendix 1 in Prehistory and Human ecology of the Deh Luran Plain (F.Hole, K.Flannery, & J. Neeley), 388.

171. For a list of occurrences see Salonen Agricultura 412-413.

172. ANEP No. 89.

173. Farmers Almanac lines 95-98.

174. This method was seen by me at Malayar, Hamadan, Iran in 1970. Patty Jo Watson has also seen it in use in Western Iran, together with the use of animals trampling the grain. 'Clues to Iranian Prehistory in modern Village life' Expedition 8, No. 3, 1966, 11.

175. MSL 6, 16, Hh.VII B, 8.; MSL 6, 110 Hg. 91; CAD Vol. 21 Z, zaru B, winnower, 72.

176. Darby W.J., Ghalioungui P, Grivetti L, Food: the Gift of Osiris II, Fig. 12.1.

177. Salim S.M. Marsh Dwellers of the Euphrates Delta, 87-88

178. Landsberger Jahrezeiten, 248-297, especially the Table on 284.

179. Adams Diyala, 16, Table 5.

180. Russel J.C. Tillage Practices in Iraq, 14-15

181. Dalley et al. Nos. 295 and 296.

182. AASOR XVI (1936), Pfeiffer R.H. and Speiser E. 'One 100 new selected Nuzi texts', 33 & 95, No. 41.

183. Zaccagnini C. 'The Yield of the Fields at Nuzi' Oriens Antiquus XIV, 1975, 210-214. Out of 7 fields with a rate yield of 10:1, 4 were irrigated or on watercourses; out of 21 with an 8:1 ratio 14 were irrigated or on watercourses.

184. Iraq XIV, 41,lines 36-40.

185. Information about this canal comes from Oates D. Studies in the ancient History of Northern Iraq, 43-49.

186. ibid., 48.

187. Luckenbill D.D. Ancient Records of Assyria & Babylonia II, 278-9, paras, 726-728.

188. Jacobsen T & Lloyd S. Sennacherib's Aquaduct at Jerwan, 6-18

189. Oates D. Studies in the ancient History of Northern Iraq, 50-51.

190. Safar F. 'Sennacherib's project for supplying Erbil with water' Sumer III, 1947, 23-27.

191. Chambers Encyclopaedia Vol. X, 'Persia', 573.

192. Buringh Soils, 217-218, and Fig. 21.

193. Laessøe J. 'Irrigation systems at Ulhu' JCS V, 1961, 29.

194. Postgate Archive, 98-100, No. 64, especially notes on lines 8 & 9.

195. Laeossøe J. JCS VII, 1963, 15, discussion and translation of Octagonal Prism BM 10300 (CT26, 1-37) vii 45-59.

196. Dowson V.H.W. Dates & Date Cultivation of the 'Iraq, 20-23

197. Layard II, No. 15 (discussed in Laessøe J. JCS VII, 17-22)

198. Oates D. Studies in the ancient History of Northern Iraq, 47.

199. Wiseman D & Kinnier- Wilson J.V. 'Nimrud Tablets' Iraq XIII 1951, 107, ND 416.

200. Russel J.C. Tillage Practices in Iraq, 10-13.

201. Adams Diyala, 16, Table 5, Note that Russel says July and August (Tillage... 10). These dates seem very late and may only apply to certain mountainous areas.

202. Kohler J. & Ungnad A. Assyrische Rechtsurkunden, 109, No.140 (K.400=J:83)

203. Parker B. 'Economic Tablets from the Temple of Mamu at Balawat' Iraq XXV, 1963, 93, Nos. BT 112, line 10, and 99 BT 136, line 13. Plate XXIV.

204. Dalley et al. No. 294.

205. Moortgat A. 'Assyrische Glyptik des 13. Jahrhunderts' ZA 47 1941-2, 81, Nos. 66 & 67; Porada I, Plate XCV, No. 653.

206. Russel J.C. Tillage Practices in Iraq, 49.

207. Place V. Ninive et l'Assyrie, III, Plate 1, 2 & 3. I, 87.

208. Grohmann C.J. Principles and Practice of Statistics, 16-18 The larger the sample is the greater the chance for accuracy so that it would be desirable for more texts to be examined, particularly in the Early Dynastic and Agade periods.

209. Bauer No. 9, ii 1. seed allocated for sowing.

210. Diyala Report, 37. Appendix XVI (averages corrected to SÌLAS per ikû.)

211. Bauer No. 39, vi 1-2.

212. ibid. No. 40 iii 1 - iv 2.

213. RTC No. 195 1-4.

214. Pinches Amherst No. 13. This text and RTC No. 195 give details of the yields of fields which grow barley, emmer wheat and 'bread wheat'. But the areas allotted to the different cereals are not given. As the amounts of emmer wheat and 'bread wheat' are so small when compared with barley yield (in Pinches Amherst No. 13 there is over 41 times as much barley as emmer wheat and 64 times as much barley as 'bread wheat') the three cereals have been lumped together as barley. It should be remembered that this alters the yield per ikû slightly.

215. Pinches Amherst No. 32. This text gives a list of land areas with the amount of barley to be sown in each BUR. Four different seeding rates are given:
1 GUR 240 SÌLA per BUR - 30 SÌLA per ikû.
1 GUR 195 " " " - 27.5 " " "
1 GUR 150 " " " - 25 " " "
1 GUR 60 " " " - 20 " " "
The sizes of the areas to be sown vary from 21 BUR 5 ikû to 1 BUR. The year is given as Šulgi 44.

216. Pettinato G & Waetzoldt H. 'Saatgut und Furchenabstand beim Getreideanbau' Studia Orientalia XLVI, 273, Table 1a.
27.5 ikû; 389.5 SÌLA 5 GÍN = 14.16 SÌLA per ikû.
63 " ; 948 " = 15 " "
32 " ; 393.33 " = 12.29 " "
50 " ; 730 " = 14.6 " "
Average 14 SÌLA per ikû.

217. ibid., Table 2a. 594.24 ikû; 9966.5 SÌLA = 16.79.

218. TCS I No. 93, possibly from Lagaš, but area uncertain.

219. Maekawa K. 'Agricultural production on ancient Sumer' Zinbun 13, 1974, 11 (RTC No. 407)

220. ibid., 15 (TUT 1) Tables 6 & 7. But note that Diyala Report, 38, gives the average for all the fields as 402 SÌLA.

221. Maekawa K. Zinbun 13, 1974, 26 ff. and Table 9. Amar-Sin, 7.

222. ibid. 26, Table 10. Amar-Sin 8.

223. ibid., 27-40. Table 11.

224. TCS 1 No. 339, line 3.

225. ibid., line 11.

226. ibid., line 12.

227. ibid. No. 340, line 1.

228. ibid., line 2.

229. ibid., line 3.

230. ibid., line 7.

231. ibid., line 8.

These two letters give details of small fields, with interest in silver and yields in barley. No. 339 also lists the issue of barley to individuals, the purpose for this is not given. It is not certain whether the yield refers to the previous harvest or is the estimate for the following one; if it is the latter it is presumably based on a previous harvest. In No. 339 the sizes of the fields vary from 1 ikû to 1 burru while those in No. 340 vary from 1.5 ikû to 13 ikû. They may have been allotted to individuals as plots to help in their support - the items are said to be debited to the domestics of the temple of Šulgi. The yields per ikû vary from 75 SÌLA (in a field of 4 ikû) to 3 BUR 100 SÌLA (1000 SÌLA) on a field of 1 BUR. The differences in the yields between these different parcels of land, some at least which come from the same field (the field of Ungamu, No. 340 line 12) is probably due to the different positions of the parcels; some will have been easier to ir igate than others, some will have more saline soil, some will be in depressions etc.

232. UET III No. 1358 lines 1-3, 7-8 (Šu-Sin Year 6)

233. Dalley et al. No. 322.
This text, from Rimah, is a long table divided into three columns on each side. The columns are made up of a list of personal names beside which a measurement of land and a capacity measure is given. There are running totals throughout and these show that the entries refer to land and barley, and sometimes burrum-wheat, belonging to different towns. Only one town name can be read - Qatara.
The ratio between the land and seed usually works out at 10 SÌLA per ikû and the amount of burrum-wheat seed appears to be the same as that of barley seed. The table is badly damaged.

234. SLB 1/2 (Larsa) No. 46, 7.

235. Goetze A. 'Thirty Tablets fro m the reigns of Abi-ešuh and Ammidatana' JCS 2, No. 33. The rate of seed for fields varies from 1 GUR 3 PI to 1 GUR 1 BÁN per BUR - 26-27 SÌLA per ikû.

236. Diyala Report, 41, Appendix XIX, taken from CT 33 No.42; CT 33, No. 45; CT 33 No. 48; CT 6 Nos. 41, 44 & 48; VAS 9 Nos. 158 & 159.

237. Diyala Report, 41, Appendix XIX, taken from CT 4, No. 42; CT 6 Nos. 24; CT 8 Nos. 10, 11, 14; 40; VAS 7 Nos. 59, 68, 69, 90, 95, 101, 102, 103, 125, 130, 145.

238. Birot M. Tablettes économiques et administratives d'époque Babylonienne ancienne, 8-37 Nos. 1-11.

239. Zaccagnini C. 'The yield of the fields at Nuzi' Oriens Antquus XIV, 1975, 194. Average of figures.

240. ibid., 214-215; CAD 5, G, gajjãtu, 11.

241. Diyala Report, 5. (Refs. Nikoloski 31, DP 573.)

242. ibid., 5. (DP 577)

243. ibid., 6 (for Lagaš see HSS IV No. 27; for Ur, UET III Nos. 1369, 1367 & 1357.)

244. The Isin/Larsa yields are the average of the Ur III and Old Babylonian yields. The Kassite are the late Old Babylonian figures. The Neo-Assyrian figures are taken from the average of the Nuzi yields and the late Old Babylonian figures.

245. Ministry of Planning: Results of the agricultural..., Tables 4 & 9.

246. Ministry of Planning: Statistics Abstract 1960, Baghdad, 1961, 59. Table 59.

247. Ministry of Planning: Results of the agricultural..., taken from Table 9.

248. Iraq Handbook, 455.

249. ibid., 352. These po ulation figures are based on totals 90% of which have been registered and to which local estimates were added. They are not reliable. The figures for 1935 were 3,380,533.

250. Iraq Handbook, 455-6.

251. Ministry of Planning: Results of the agricultural..., Tables 7 & 8, Table 9 for yields.

252. CAD Vol. 7, I, išparu, 255-56.

253. Leemans W. Foreign Trade during the Old Babylonian period, 19-21, 47, 128-9.

254. e.g. Gadd Stones Plate 29b.

255. Barnett R.D. Assyrian Palace Reliefs, Plate 17.

256. R.Acc. 'Le Rituel du Kalû' 3-9 ff.

257. Maxwell G. A Reed shaken by the Wind, 63.

258. VR No. 234; Barnett R.D & Faulkner M.'Sculptures of Aššurnaṣir-pal II..., Plate V.

259. e.g. professions given in An.Or.2; 5, 2) Nik.13; 3, 1) STH 1,5; 61, 32)Dp 171.

260. Gelb I.J. 'Growth of a herd of cattle' JCS 21, 1967, 64-69.

261. Postgate J.N. 'Some Old Babylonian Shepherds' JSS 20, 1975, 5.

262. Adams Diyala, 14 and 169, Note 2.

263. Bauer No.4, vii, 4-6, and p.83.

264. Driver G. R.and Miles J.C. The Babylonian Laws 30-31, CH 57.

265. ARMT IX, 207, para. 3, No. 38.

266. e.g. see Lagaš: Early Dynastic: Both wool and fat-tailed sheep and goats kept for their coats were given 1 SÌLA and .6 SÌLA barley per day respectively. (Bauer No. 42, iv 10; No. 43, v 9 - vii 9); Pigs (ŠAḪ.Ù and ŠAḪ.GIŠ.GI) were given.6, 14 and .2 SÌLA per day. (Bauer No. 41 iv 9 - v7)

Ur III: Lagaš: Pinches Amherst No. 29: oxen received 8 SÌLA and 5 SÌLA per day.
Umma: Eames Coll. C 5: sheep received 3.3 SÌLA and .3 SÌLA per day.

Old Babylonian: Mari: ARMT VII No. 263, 14: plough oxen received 5 SÌLA per day; ARMT IX No. 242, i: a male sheep was fattened with emmer-wheat.
Chagar Bazar: AOAT I No. 22, 3-5: oxen received 10 SÌLA and 3 SÌLA per day at the fattening house and a male sheep received 1 SILA. ibid., No. 2, 3-5: calves received 4, 3 & 2 SÌLA per day (aged 3, 2 & 1); ibid. No. 32, 3-4: pigs received 3 SÌLA per day.

Mid-second millennium: Nuzi: HSS XIII No. 78, 1-2: pigs were fed barley.

267. CAD Vol. 8, K. kissatu, choped straw, fodder etc., 427-28.

268. Postgate Archive No. 195, lines 6-9, ND 462.

269. Postgate Taxation, 381-83; ND 2495 lines 22-26.

270. Iraq XIV, 43 line 106.

271. e.g. BE XIV No. 48 where the male goats (34) and the male sheep (47) are the most numerous in comparison with the 31 nanny goats and the 38 ewes.

272. Bauer No. 99 i 5, ii 4 passim.

273. ibid., 301.

274. CAD Vol. 2 B bīru B, 266, but note discussion.

275. Oppenheim A.L. 'A note on ša rēši' Journal of the Ancient Near Eastern Society of Columbia University, 5, 1973, 325-26; RA 68, 1974, 95 No. 11.

276. Hilzheimer M. Animal Remains from Tell Asmar, 33-34.

277. Parrot Sumer Nos. 87 & 89.

278. Heinrich E.H. Kleinefunde aus den archaischen Tempelschrichten In Uruk, Plate 19a. (W145971)

279. Moortgat Art No. 17 & No. 18.

280. Hilzheimer M. Animal Remains from Tell Asmar, 33 Note 58.

281. Frankfort H. Stratified Cylinder Seals Plate 7, No. 39

282. ibid. Plate 42, No. 462.

283. ibid., Plate 31 No. 315.

284. Frankfort H. Sculpture in the Diyala Plate 111 No. 197.

285. Heinrich E.H. Kleinefund..., Plate 17b.

286. Epstein H. Origins of the Domestic Animals of Africa II, 104.

287. Stone heads: UVB XI, Plate 33 a-c (W.17834, W.17875)
Inlay: ibid., Table 34 a-e.

288. Mackay E. A Sumerian Palace and the 'A' Cemetery at Kish, Mesopotamia, Plate XXXVI No. 1.

289. Parrot Sumer No. 177.

290. Frankfort H. Sculpture in the Diyala Plate 92 D157.

291. Starr Nuzi II, Plate 57 W (also Plate 112 A)

292. Mallowan M.E.L. & Davies L.G. Ivories in Assyrian Style, Plate XXXIV No. 132.

293. Epstein H. Origins of the Domestic Animals of Africa, 167, 169, Fig. 211.

294. Parrot Sumer No. 177.

295. Gadd Stones Plate 29a, 46; Barnett R.D. & Faulkner M.

Sculptures of Aššurnaṣirpal II... Plate V; Barnett R.D. Assyrian Palace Reliefs, Plate 151.

296. Epstein H. Origins of the Domestic Animals of Africa, II, 169-70.

297. UET II, 6, A, 16 i 6.

298. e.g. Early Dynastic: Lagaš: Bauer No. 43 vi 0, vii 3.
Ur III: Umma: Eames Coll. W 93; Lagaš: Pinches Amherst No. 20, i 6; Puzriš-Dagan: Eames Coll. G14.
Old Babylonian: Larsa: Walters S.D. Waters for Larsa, No. 21, lines 1, 3 passim.; Mari: ARMT VII Nos. 127 & 129.

299. CAD Vol. 5 G gukkallu 126-7.

300. Oppenheim A.L. & Hartman L.F. 'Domestic Animals of Ancient Mesopotamia' JNES IV, 1945, 156, lines 23-27.

301. ibid., line 16 and note 19.

302. Parrot Sumer No. 88.

303. UE II/2, Plate 87, 88 & 89, Plate 119.

304. Parrot Sumer No. 158, C.

305. UVB XIX, 40, Table 28 (W.20067)

306. Barnett R.D. Assyrian Palace Reliefs Plate 146; British Museum Assyrian Sculpture in the British Museum..., Plate XXII; Barnett R.D. & Faulkner M. Sculpture of Aššurnaṣirpal..., Plate VI.

307. Oppenheim A.L. & Hartman L.F. JNES IV, 1945, 166, lines 193-299.

308. ibid., line 215; CAD Vol. 4 E enzu 180-183.

309. Epstein H. Origins of the domestic animals of Africa I, 226 & 249.

310. Mallowan M.E.L. 'Excavations at Tell Arpachiyah' Iraq II, 1935, Fig. 55.

311. Parrot Sumer No. 109.

312. ibid. No. 108.

313. Frankfort H. Stratified Cylinder Seals, Plate 6 No. 33.

314. Epstein H. Origins of the domestic animals of Africa I, 249.

315. UE II Plate 115.

316. Heinrich E. Kleinefunde... Plate 14a.

317. Parrot Sumer No. 184.

318. ibid., No. 185.

319. Parrot A. Le Palais, Peintures murals II, 19-21, Fig. 18, Plates V2 and Ba.

320. Moortgat Art, Plate 274.

321. Goff B.L. Symbols of Prehistoric Mesopotamia, Fig. 474.

322. UEI Plate XXXI.

323. Epstein H. Origins of the domestic animals of Africa I, 305-6.

324. ibid., 535.

325. Allchin F. 'Early Domestic Animals in India and Pakistan' in Domestication and Exploitation of plants and animals (eds. P.J. Ucko & G.W.Dimbleby), 319.

326. Zeuner F. A History of domesticated animals, 217, Fig.8:15

327. Mallowan M.E.L. 'Excavations at Tell Chagar Bazar' Iraq IV, 1937, Figs 10, 1, 2 & 6 & 30.

328. Parrot Sumer No. 360.

329. Starr Nuzi I, 388; II, Plate 65 D & E.

330. Salonen Agricultura Plates V 1-2 and VI 1-2.

331. VR No. 431 & 459.

332. Thompson R.C. & Hutchinson R.W. Liverpool Annals of Archaeology and Anthropology XVIII, 1931, Plate XXXII, 2.

333. Gadd Stones Plate 9 & 11a.

334. ibid., Plate 14.

335. ibid., Plate 34.

326. ibid., Plate 11.

337. Loud G & Altman C.B. Khorsabad I, Fig. 104.

338. King L.W. Bronze Reliefs from the gates of Shalmaneser, Carcemish, Plate XXXIV; source of the Tigris Plate LIX.

339. Hatt R. Mammals of Iraq, 68; Lloyd S. 'Iraq Government Soundings at Sinjar' Iraq VII, 1940, 16, Plate II, Fig. 5, No. 9.

340. UE III Plate 31 No. 537.

341. Boehmer No. 232; for other examples of water buffalo see Boehmer Nos. 202, 223, 231 etc.

342. Van Buren E. Fauna of Ancient Mesopotamia, 74, para. 29B

343. Epstein H. Origins of domestic animals of Africa I, 569.

344. Oppenheim A.I.& Hartman L.F. JNES IV, 1945, 170, lines 314-5.

345. Salim S.N. Marsh Dwellers of the Euphrates Delta, 90-91.

346. Hatt R. Mammals of Iraq, 69.

347. Oppenheim A.L. & Hartman L.F. JNES IV, 1945, 166, line 281.

348. CAD Vol. I/1 A. alpu 364-372; CAD Vol. 9, L littu A 217-219.

349. e.g. Pinches Amherst No. 4.

350. CAD Vol. I/2 A apsasû, 193-194: 1a.

351. Boehmer R.M. 'Das auftreten des wasserbuffels in Mesopotamiens..' ZA LXIV,1975, 10ff.

References and Notes for Chapter 3. (pages 105-148)

1. Weinstein M. 'Household structures and activities' Anatolian Studies 23, 1973, 275 - it is apparently difficult to distinguish between burghul and badly preserved wheat although grains which have been sieved can be recognised.

2. McCown D.E. and Haines R.C. Nippur I: Temple of Enlil, Scribal quarters and soundings. TB Level IV House I, Room 197 and 192, 50-53 and Plate 59; TA IV House C, Room 73, House H, Room 214, 38 and Plate 75A.

3. Aykroyd W.R. and Doughty J. Wheat in Human Nutrition, FAO Nutritional Series 23, 64.

4. Weinstein M. Anatolian Studies 23, 1973, 272-3 and 275.

5. Porada E. 'Relative Chronology of Mesopotamia: I' in Chronologies in Old World Archaeology (ed. R.W.Ehrich), 176.

6. Perkins A. Comparative archaeology of Early Mesopotamia, 125-126.

7. Van Buren E.D. 'Places of Sacrifice' Iraq XIV, 1952, 80-81

8. ibid., 79-80.

9. Delougaz P.& Lloyd S. Presargonic Temples in the Diyala, Nintu temple: 89 and Fig. 83, Plate 16; 6th building period P 44: Court 53, Sin II East Wall of Court 5 Q42:3, 63 and Plate 11 (This survives from an earlier period.)

10. Parrot A. Le Palais - architecture, II, 313, Fig. 382.

11. Peterson H. Wheat, 321. 'Endosperm: the nutritive tissues formed within a seed which has the function of nourishing the embryo during germiniation and early growth.', 400.

12. CAD Vol. 9, L. 96-7, laptu B: roasted barley.

13. An.Or.2, 25-26 No. 2 (RTC 52); 27-29 No. 4 (VAT 4660)

14. SET No. 181 lines 18 & 19. ŠE.SA.ZI, a type of roasted barley; ZI.ŠE.SA, flour of roasted barley.

15. AfO 18, 328, lines 30 & 31; CAD Vol. 5, G, 118, gubibtu parched barley; CAD Vol. 5, G, 117. gubbubu to roast; CAD Vol. 8, K, 2. kabābu to burn, scorch etc.

16. Iraq XIV 43: col. iii lines 121 & 129.

17. see Salonen A. 'Die Ofen der Alten Mesopotamien' Baghdader Mitteilungen III, 104-106.

18. CAD unpublished M. Volume, consulted in draft in Chicago. AHw, 273, mundu a fine meal.

19. AfO 18, 330 line 193.

20. Lambert RA 59, 119 No. 16.

21. ibid., No. 15.

22. MAD 5, No. 107, line 9. Linear numbers are used in this text which probably dated to the later part of the Sargonic period. The figures in the text do not add up to the total given in line 16.

23. Pinches Amherst No. 65, line 2.

24. ibid., No. 102, line 7.

25. BE III/1 Plate 57, No. 126, line 9.

26. ARMT XIX e.g. Nos. 213-222.

27. ARMT XI No. 1 lines 3 & 10; No. 3, lines 2 & 10; No. 4, lines 2 & 9; all date to the 'Assyrian Epoque'. ARMT XI No. 250, line 6.(Ḫanat).

28. AOAT I Nos. 9, 10, 20, 24 & 27.

29. AHw 1016 samādu to crush, grind.

30. AfO 18, 330, line 193.

31. BE XV No. 169 (Torczyner Tempelrechnungen No. 63) (Note that Torczyner has left out the amount of BAPPIR-bear bread.)

32. HSS XIII No. 81, 2 and HSS XIV No. 611,1, respectively.

33. Gadd C. 'Tablets from Kirkuk' RA 23, 1926, 132, No. 60. lines 9-10. (see also Wiseman D. 'Ration lists from Alalakh VII' JCS XIII, 1959, 20, No. 242, line 1, where barley was used for mundu at Alalakh also.)

34. Oppenheim Beer, 27, note 28a and 52, note 92.

35. AfO 18, 330, line 193.

36. CAD Vol.I/a A, arsānu (a kind of groats), 306-307.

37. Hrozny Getreide, 105 Note No. 1; DAB 99, note 2.

38. MAD 5, No. 107, line 8.

39. SET No. 188, lines 10, 41, 67, 109.

40. e.g. ARMT IX No. 121 Col. ii, line 33, where arsānu is recorded once in 22 days.

41. AOAT I Nos. 20 & 25.

42. BE XV No. 169 (Torczyner Tempelrechnungen No. 63, see also note 33.)

43. HSS XII No. 406, line 46.

44. AfO 18, 328, line 32.

45. Oppenheim Beer, 26, line 25 & 52, Note. 82.

46. SET No. 181, line 5, 107 Note 5.

47. BE III/1, Plate 57, No. 126, line 3 and line 16.

48. see references listed in Hrozny Getreide, 123-4; and HUCA 38, 1967, Levine B. & Hallo W.W. 'Offerings to the Temple Gates at Ur', Table A, Fig. 1. Al 26 (UET III No. 270) passim. (Note that UET III No. 270 may be post-Ur III, 19.)

49. CT 32, plate 3, VIII 8 ff. in Hrozny Getreide, 123.

50. ARMT XII No. 1, lines 11 & 12.

51. See the list of years at Mari in Dossin G. 'Les noms d'années dans les "Archives de Mari"' Studia Mariana, 1950. Texts come from ARMT VII, IX, XI & XII (see note 123 in Chapter 4.)

52. ARMT IX, No. 98, col. v lines 29-32; ARMT XII No. 432 & 437.

53. AHw, 824, pappāsu = barley por idge or pudding.

54. Hrozny Getreide, 99 ff.

55. ibid., 104.

56. Oppenheim Beer, 26, col. iv, 25.

57. AfO 18, 33, line 168.

58. King L.W. Chronicles concerning the Early Babylonian Kings II, 16, lines 4 & 5; Ungnad A. 'Woran starb könig Era-imitti von Isin?' Or. (NS) 12, 1943, 194-195 - here pappāsu is translated as BREI; Hrozny Getreide, 106.

59. Pinches Amherst No. 102, line 3; SET No. 181, 3, 31.

60. ARMT IX No. 121, col. iii lines 37-38, col.vi lines 5 & 6.

61. B E XV, Plate 13, No. 44, line 23.

62. HSS XVI No. 120, 5; HSS XIV No. 51, line 4. See also Cassin E. 'A Propos des archives administratif de Nuzi' RA 52, 1958, 20.

63. Chambers Encyclopaedia No. 5, 742.

64. Personal letter from Dr. N.L. Kent, of the Flour Milling and Baking Assoication (12th September 1973.)

65. Mackay E. A Sumerian Palace and the "A" Cemetery at Kish, Mesopotamia, Part 2, 201 and plate LVI No. 6.

66. Starr Nuzi I: mortars: 462 (pestle found in mortar in Shil.26); 218, grinding stone F.31; II, Plate 122, A (Shil.14), B (P.302), & E (Shil.26), Plate 121 FF (small hand mortar).

67. Mallowan Nimrud, I, 181.

68. von Oppenheim, M. Tell Halaf (n.d.), 206.
von Oppenheim M. Tell Halaf Vol. IV (ed. B.Hrouda), 51, Plates 38 a, c, Plate 39, a, b, c; Childe V.C. 'Rotary querns on the continent and in the Mediterranean Basin' Antiquity XVII, 1943, 21-24.

69. Macalister R.A.S, The Excavations of Gezer, Vol. II, 36-37.

70. CAD Vol. 4, E elītu, 98-99, No. 2 upper millstone; AHw 1172, šapiltu 'das Untere'.

71. CAD Vol. 4, E erû B and listed examples, 323-324, grinding slab.

72. King L.W. Bronze reliefs from the Gates of Shalmaneser, Plate VI, Band I, 6, upper register, and XXX, Band V, 6, lower register.

73. AHw, 913, ZÌ/qēmu, flour.

74. Hronzy Getreide, 102; Oppenheim Beer, 28, line 25; CAD Vol.7 I, isqūqu 202-203; Pinches Amherst No. 90, line 1 & 20, No 81, line 1, (Lagaš, Ur III); MAD 5, No. 107, lines 3, 5 etc. (Kish, Agade); AOAT I No. 1, line 1, (Chagar Bazar, Old Babylonian).

75. Oppenheim Beer, 28, col. v line 20.

76. Hrozny Getreide, 118 and 127, and index.

77. e.g. Tello: de Genouillac H. ITT/II/2, 3 (Catalogue list) (No. 2857); 10, (catalogue list) (No. 2979).
Umma: Lambert RA 59, 123, No. 40 iii lines 37.
Kish: MAD 5, No. 113, lines 3 & 7.
Nippur: BE III/2, plate 57, No. 126, lines 8 & 18.

78. mirqu and marāqu, to crush finely. CAD unpublished volume M, consulted in Chicago in draft.

79. BE XV Plate 44, No. 140, line 3.

80. CAD Vol. 7, I isqūqu, 202-203; AfO 18, 330 line 167.

81. ARMT VII, 262, para. 9.

82. CAD Vol. 6, H ḫašlu, crushed, 141.

83. Oppenheim Beer, 28, col.v, line 21.

84. Puzriš-Dagan: Keiser C.E. Neo-Sumerian Account Texts from Drehem Nos. 393, 1, 394, 1.
Tello: SET No. 181, 4, 22; ITT II/2, No. 4393 Plate 65, R 2'-3'.

85. Umma: SET No. 188, 40, 64 (also Agade: Lambert RA 59 No. 40, line 39, 123).
Tello: SET No. 210, 1; Pinches Amherst No. 67; ITT II/2 Nos. 2857 & 2979 - these latter two texts include a flour ZÌ.GAZ: GAZ = ḫašālu to crush (CAD Vol. 8 ḫašālu 137/8) This may be a similar flour to ZÌ.KUM.

86. Tello: SET No. 181, 4, 6, 32; Bauer No. 42 iv 3, 4.
(Ur: Levine B & Hallo W.W. H.U.C.A. 38, 1967. Table A., UET III No. 270)

87. AOAT I No. 9, line 2; 10, line 2; 20, line 2; 27 line 2.
AOAT I No. 1, lines 7 & 11.

88. ZÌ.KUM/isqūqu: References for the month of Uruham, the Year Zimri-Lim counted the land: ARMT IX No. 105, No. 107, 109; ARMT XI Nos. 176 & 1978; ARMT XII Nos. 404, 408, 409, 413, 417; ARMT VII No. 134.
ZÌ.GU: ARMT VII No. 263, col. i 8 & 12 (this text is damaged.)

89. BE XV No. 140,2.

90. AfO 18, 33, line 167.

91. Salonen A. Die Hausegeräte der Alten Mesopotamien I, 71; SACT II No. 203, 1, 2.

92. Horder Lord T.J., Dodds Sir C., Moran T, Bread, 113.

93. Burkitt D.P. Cancer 28, 1971, 2. In a personal letter (18th November 1976) Dr. Burkitt confirmed his own opinion that fibre depleted diets played a part in the development of cancer of the bowel.

94. Layard A. Early Adventures in Persia, Susiana and Babylonia I, 66.

95. ibid., 297.

96. Musil A. Manners and Customs of the Rawala Bedouins, 91-92.

97. CAD I/1 A akālu, 239a lexical section. (CT 17, 6 iii 7-9; BE 31 1, 6: 10)

98. Parker B. ' A Middle Assyrian Seal Impression' Iraq XXXVI 1974, 185.

99. Barnett R.D. Sculptures from the Northern Palace of Aššurbanipal At Nimrud, Plate LXVI e.

100. Aykroyd W.R. & Doughty J. Wheat in Human Nutrition, 56.

101. Renfrew J. Palaeoethnobotany, 69; Bulleid A. Lake Villages of Somerset 4th ed., 1949, 69.

102. Helbaek H. 'Early crops in southern England' Proceedings of the Prehistoric Society 18, 1952, 212.

103. Aykroyd W.R. and Doughty J. Wheat in Human Nutrition, 68.

104. King L.W. Bronze Reliefs from the Gates of Shalmaneser..., Plate VI, Band 1, 6, upper register.

105. ibid., Plate LI, Band IX, 4, upper register.

106. ibid., Plate XII, Band II, 6, lower register.

107. ANEP, 52, Plate 191.

108. Cylinder Seals, Plate XV k.

109. Boehmer, Plate XXXII No. 387.

110. Moorgat Art, Plate 175 & Plate 176; and Währen M. Brot und Gebäck im Leben und Glauben des Alten Orient, Fig. 23. (Note however that Währen takes the round bun-shaped loaves to be small jars.)

111. Barnett R.D. Sculptures from the Northern Palace..., Plate LXV

112. Bonavia E. Flora on the Assyrian Monuments, 15-25.

113. Rawlinson G. Five Great Monarchies II, 214; Meissner BuA, 429 Fig. 136.

114. Bonavia E. Flora on the Assyrian Monuments, 25.

115. Starr Nuzi, I, 148 & 493, II Plate 33 F.

116. CAD Vol. I/1, A akālu, 238.

117. NINDA ŠU: Pinches Amherst No. 102, line 6 (Tello, Ur III), Hoffner H. Alimenta Hethaeorum, 147. (It is possible that this bread is similar to that portrayed like 'fans' on Assyrian reliefs).
NINDA ḪAŠḪUR: MSL XI, 119 line 21; NINDA GA.DÉ.A: MSL XI, 149, line 127. For a full list of varieties of bread see: MSL XI 118-120 6.1, 1086; 148-149 ii 71-888 144; 154-156; 172-267.

118. e.g. issued to messengers along with beer and oil, at Lagaš, Ur III: Pinches Amherst No. 61, line 2, 5 etc.,; as rations at Mari and T rqa, ARMT IX, Nos. 24 & 25, Old Babylonian; as part of the provisions for his feast, Aššurnaṣirpal, Iraq XIV 43, line 115, Neo-Assyrian.

119. CAD Vol. 8, K. kusāpu, 583-4; AfO 18, 329, line 148.

120. e.g. at Chagar Bazar AOAT I No. 11, line 4. (Old Babylonian)

121. AfO 18, 329, line 154.

122. ARMT IX, 278,para. 1°.

123. Mari: e.g. ARMT VII No. 151, line 2; Chagar Bazar: AOAT I No. 9, line 3, No. 20, line 3.

124. CAD Vol. 4. E. emṣu (A), 152-153, sour.

125. e.g. ARMT IX No. 98: sub-total (including NINDA.KUM,NINDA emṣu, šipku, appānu and kakkû) ii, 26032; grand total: v ,1.

126. e.g. ARMT XI No. 157.

127. e.g. ARMT IX No. 223 (ŠE, burrum and ZIZ listed together i 5-7); ARMT IX No. 237 (here burrum and a type of ZIZ appear together.

128. ARMT IX No. 121, iii 37 - 38.

129. HSS XIV Plate 181, 4.

130. ŠL 444/68; but see Landsberger Date Palm, 37, No. 2 where he rejects 'cake' and says GIŠ.LAM is a small basket.

131. Landsberger Date Palm, 37 No. 2 and note 126 - quoting Nikolski II, 343: 15 SILA ZÚ.LUM GIŠ.LAM, 40 SILA ZÌ.A.TIR GIŠ.LAM.

132. Eames Coll. D27 .

133. SET No. 198, 1 passim.

134. UET III No. 102 line 12.

135. For varieties see MSL XI, 119, line 24-35; 149, lines 122-126; 155, lines 195-201; 159, lines ii 1-6; 163, i 8-17. AHw 646 mersu : cake made by creaming method (röhrkuchen). This translation is perhaps too specific. (See von Soden, 'Zu den Politischen Korrespondenzen des Archives von Mari' Or.21, 1952, 86.)

136. Levine BA. & Hallo W.W. HUCA, 38, 1967, Table A opposite p. 20. UET III No. 270, 31.

137. ARMT IX, 278, VII, 259.

138. ARMT XI, No. 13.

139. ARMT IX No. 238, line 13.

140. ARMT XII No. 743, lines 2-8, also No. 741.

141. UET V No. 504, line 6.

142. CT 36, plate 7, line 6.

143. AfO 18, 330 line 161.

144. CAD unpublished volume M, consulted in draft in Chicago. mutqû sweet cake or bread; AHw 698 mutqû sweet bread; In ARMT XI, No. 3 line 9, No. 4 line 10, No. 52 line 2, Burke translated NINDA mutqû as 'spiced bread'.

145. ARMT IX, 278, 4°, No. 221, iii line 5, vi line 3; ARMT VII No. 94, line 4.

146. HSS XIV No. 181 line 7 plate 81; see also Casson E. 'Quelques remarques a propos des archives administrives de Nuzi' RA 52, 22.

147. CAD unpublished volume M, consulted in draft in Chicago. mutāqu sweetmeats; AHw mutāqu 'sweet pastry', 687.

148. BE XIV No. 148, 5.

149. Hrozny Getreide, 136. It was also used with ŠE.GIŠ.Ì in the Neo-Babylonian period.

150. Goetze A. 'Contributions to Hittite Lexicography' JCS 5, 1951, 71.

151. Parrot A. Le Palais II Documents et Monuments, 33-57.

152. ibid., 50-51, figs. 42, M1154, 43, M1159.

153. Haller A. Die Gräber und Grüfte von Assur WVDOG 65, Grave 20, Plate 10b, 10; 104, Tomb 21, Plate 21a f.; The 'handled pans' have also been associated with metal working. (Calmeyer P, 'Das Grab eines altassyrischen Kaufmanns' Iraq XXXIX, 1977, 90 and Plate II)

154. Braidwood R and Howe B, Prehistoric investigations in Iraqi Kurdistan, 42.

155. Kirkbride D. 'Umm Dabaghiyah 1974, a fourth preliminary report' Iraq XXXVII, 1975, 6.

156. Van Buren E.Douglas 'Places of Sacrifice ("Opferstätten")' Iraq XIV, 1952, 82-83.

157. Delougaz P & Lloyd S. Presargonic Temples in the Diyala Region 26, and Fig.21, 2 & b.

158. ibid., Small Temple, 9th building period, 112, Fig. 104 Plate 171.

159. Delougaz P, Hill H.D., Lloyd S. Private Houses in the Diyala 172 and Plate 27.

160. UE VII, 6-7, 60-61.

161. Fernea E. Guests of the Sheikh 99-100

162. Parrot A. Le Palais - Architecture, 232-235, Figs 270 & 271

163. ibid., 215-217, Figs 251 & 252.

164. Kirkbride D. 'Umm Dabaghiyah 1972, a second preliminary report' Iraq XXXV, 1973, Plate LXXIX b.

165. Perkins A. Comparative archaeology of Early Mesopotamia, 174

166. OIC No.17, Iraq Excavations of the Oriental Institute 1932/33, 15 and Fig. 12.

167. Delougaz P, Hill H.D., Lloyd S. Private Houses..., 172, Plate 27.

168. McCown D. and Haines R. Nippur I, Temple of Enlil..., 48, Plate 54; 58 and Plate 62; 67 and Plate 72A; 71 and Plate 75 b.

169. Woolley L. Excavations at Ur, 170

170. ibid., 186; Woolley L. 'Excavations at Ur 1930-1931' Antiquaries Journal XI, 1931, 359-374.

171. Starr Nuzi I, 20-21

172. ibid., 53-54.

173. ibid., 193.

174. e.g. ibid., 207 (I7), 215 (F37), 307 (S144)

175. Wallowan Nimrud, 186-187

176. Gadd Stones Plate 29a.

177. King L.W. Bronze Reliefs from the Gates of Shalmaneser... Plate VI Band I, 6, upper register.

178. AfO 18, 306-309, iv lines 12-18; Kocher F. 'Ein Inventartexte aus Kar-Tukulti Ninurta' 300-313.

179. AHw mussiru 1) Middle Assyrian, an oven flue, 678.

180. For discussion and a list of different terms for ovens see Salonen A. 'Ofen der Alten Mesopotamier...' Baghdader Mitteilungen 3, 1964, 100-124; MSL VII, 5, line 339, 87, lines 368-370.

181. These ovens mainly occur in the middle and south of Mesopotamia. They are probably not direct descendants of the ovens at Jarmo and Umm Dabaghiyah, evidence for chimneys is rare save for the one at Mari, but the principle of working through one entrance is the same.

182. Chambers Encyclopaedia Vol.2, 196, beer; 536, brewing.

183. Platt B.S. 'Some traditional alcoholic beverages and their importance in indigenous African communities' Proceedings of the Nutritional Society 14, 1955, 117 ff.

184. Platt B.S. and Webb R.A. 'Fermentation and Human Nutrition' Proceedings of the Nutritional Society, 4, 1946, 130 ff.

185. Oppenheim Beer.

186. Civil M. 'A Hymn to the Beer Goddess' Studies Oppenheim 67-80

187. Oppenheim Beer, 26 iv, lines 3-22.

188. ibid., 24-26, iii, 27 - iv 2.

189. ibid., 24, iii 15-25.

190. ibid., 26-28, iv 25 - v 33.

191. ibid., 24, iii 8 - 14.

192. Civil M. Studies Oppenheim, 70 & 73, lines 33-36.

193. ibid., lines 38-40

194. ibid., lines 40-48

195. Helbaek H. 'Mandeltime farming products at Eketorp on Öland, Sweden' Acta Archaeologica 37, 1966, 218.

196. Civil M. Studies Oppenheim, 70 & 73, lines 21-34.

197. Platt B.S. & Webb R.A. Proceedings of the Nutritional Society 4, 1946, 135.

198. Civil M. Studies Oppenheim, 81. preparation of the wort.

For more details on beer and brewing in Mesopotamia see Röllig W. Das Bier in Alten Mesopotamien Berlin 1970, and Stol M. 'Zur Altmesopotamischen Bierbereitung' (Review of Röllig) Bi.Or. XXVIII, No.3/4, 1971, 167-171.

199. AHw šikāru, 1232

200. Oppenheim Beer, Fig. 6; Boehmer No. 557.

201. Delaporte Catalogue Louvre I, Plate 50, No. 5(D21)

202. Oppenheim Beer, 55, correction to 8.

203. Boehmer No. 549

204. An.Or. 2, 25 (VAT 4414), 26 (RTC 52)

205. Bauer No. 153, xiii, 3 and No. 154 xi, 1. (cf. Oppenheim Beer 14)

206. Lambert RA 59, 119 No. 16

207. Walters S.D. Waters for Larsa, 25-26, No. 23 lines 2 & 3.

208. Iraq XIV, 43, line 119.

209. Oppenheim Beer, 13-14.

210. MSL XI, 114-116, 2.1, 1-2.3; line 55; 150 iv 167-208; 153, 45-100.

211. Bauer No. 58, line 2, 3. c.f. Nos. 41, 42 & 43. Barley is listed for BAPPIR-bread, $MUNU_x$, and TITAB for the making of KAŠ.GÍG and KAŠ.KAL

212. ibid., No. 59

213. ibid., No. 60. For KAŠ.SUR see Civil M. Studies Oppenheim, 81. SUR = to perform an action from which liquid results.

214. Pinches Amherst No. 103, i 1, ii 7-iii 1, iii 5 - iv 1 etc.

215. STT No. 177, 55 (written $KAŠ.GE_6.ZÍZ.AN$ dark ulušinnu) ii 1, ii 1

216. UET V No. 507, discussed in Levine B & Fallo W.W. HUCA XXXVII 1967, Table B, Fig.3.

217. Oppenheim Beer 22, ii lines 3-8.

218. Waterman L. Royal Correspondence of the Assyrian Empire II No. 1405, rev.3.

219. CAD Vol.2, B billatu, 225-228

220. Pinches Amherst No. 103, 1 & 3.

221. An.Or. I, no. 103

222. Pinches Amherst No. 68, 1.

223. SACT II, e.g. No. 295, lines 1 & 5.

224. ARMT IV No. 81, line 25. letter from Išme-Dagan to Yasmah-Addu.

225. ARMT VII No. 263, ii 13, iii 1-12.

226. SLB 1/3 No. 116, line 1 (Lagaba)

227. CAD Vol. 2 B billatu, 228

228. Pinches Amherst No. 56, line 3. Pinches reads the sign as GIN but it would seem to be UŠ.

229. AOAT I No. 23, line 3.

230. ibid., No. 36, lines 5, 6, 10, 11 & 16-18; No. 43 lines 1-10, 141-6; No. 46, lines 1-8, 11-13; Gadd C.J. 'Tablets from Chagar Bazar and Tell Brak' Iraq VII, 1940, A.926, A944.

231. BE XIV Plate 24, No. 56, line 4.

232. Iraq XIV, 43, line 122.

233. CAD Vol. 3 D dišiptuḫḫu, 160; Hrozny Getreide, 144-145.

234. Hrozny Getreide, 147.

235. Civil M. Studies Oppenheim, 67.

236. CAD Vol. I/1 A alappānu 335-336.

237. DAB 314.

238. ARMT IX No. 98, vi 2 & 3.

239. ARMT XII No. 740, lines 5 & 7, No. 742 lines Rev. 7., and Nos. 743, lines 13-18.

240. Oppenheim Beer, 16, cf. Civil M. Studies Oppenheim 82 ff. Landsberger B & Balkan K. 'Die Inschrift des Assyrischen Konigs Irisum' Belleten 14, 1950, 243-248.

241. e.g. ARMT XII Nos. 378, 390; ARMT IX No. 103; ARMT IX No.98 iv 1-12.

242. Frankfort H. Stratified Cylinder Seals, Plate 35, No. 359

243. Buchanan B. Catalogue of Ancient Near Eastern Seals, I, Plate 19 Nos. 230, 231.

244. UE II Plate 194, No. 22 (U 12374)

245. Frankfort H. Stratified Cylinder Seals, Plate 58, No. 613

246. Porada I, Plate XVIII No. 112, cf. UE III Plate 30 Nos. 523, 524 and Plate 194 No. 22.

247. Porada I, Plate XVII No. 106 B.

248. UE II Plate 193, No. 17 (U 10871)

249. Moortgat Art No. 42.

250. ibid., No. 47

251. Porada I, Plate XXXIX No. 250E, 252.

252. e.g. Porada I, Plate LVIII Nos. 315 E, 320 E & 327; Cylinder Seals Plate XXVII b g.

253. Oppenheim Beer, 12 and 40, note 23.

254. ibid., 9-10 (see UE XIV Plate 20, No. 42, line 3- Torczyner Tempelrechnungen No. 64 - for the Kassite example)

255. Oppenheim Beer 55, correction to 11.

256. see above Vol. 1, pp.138/9, and notes 200, 201 203, especially Boehmer No. 549.

257. Salonen Hausgeräte I Plate LXXXV No. 4, Tepe Gawra VIII B-C (Jemdet Nasr)
Delougaz P Pottery from the Diyala Plate 195, D556.540a, Houses 3, Khafajeh. (Early Dynastic III)
ibid., Plate 194, D555.510B. Tell Asmar (Early Dynastic III/ Agade)
McCown D & Haines R. Nippur I, Temple of Enlil..., Plate 80, No. 8 (Ur III)
Andrae A. Die Archaischen Ischtar Tempel in Assur Plate 25a. Level G (Agade)
Lenzen H.J. Excavations in Uruk-Warka UVB 19, 40 Plate 27c. Sin-Kašid's Palace. (The hole is here said to be caused by burning) (Isin/Larsa)
Mallowan M.E.L. 'Excavations at Tall Chagar Bazar' Iraq III, 1936, Fig. 28 No. 1, Fig.16 No. 2 (Both these are flat-bottomed and the hole is central). Level I (mid-second millennium)
Starr Nuzi II, Plate 82A, Plate 81 F, S.153, Plate 68 M, K.189. (mid-second millennium)

258. Mallowan M.E.L. 'Excavations at Tall Chagar Bazar' Iraq III 1936, 28, No. 18, Fig.28, 1.

259. Civil M. Studies Oppenheim, 82-83.

260. Mallowan M.E.L. 'Excavations at Tall Chagar Bazar' Iraq IV 1937, 151, and Plate XIV C.
For examples of drinking tubes dating to the third millennium see: OIC 17, 39, Fig. 35 (Asmar); and UE III, PG/800, contents list, 444, 81-82, 91 (U10450, U10915, U10911)

Pages 148- 181.

261. J.Fac.Med. XIV, 1950, 89 & 94-95.

262. SACT I, No. 138, 5 & 6.

263. ibid. No. 163, 4, 5.

264. ibid., No. 175, 4, 5, 10, 11.

265. e.g. Eames Coll. Nos. H13, KK6, N6.

266. UET III Nos. 89 & 1229.

267. ibid., No. 1303.

268. ibid., No. 102 lines 1, 4-12.

269. TCS I No. 325, lines 3-4: 30 carcases of sheep for captives to eat.

270. SACT I No. 245.

271. Walters S.D. Waters for Larsa No. 21 lines 1-4.

272. Goetze A. 'Thirty tablets from the reigns of Abi-ešuh and Ammiditana' JCS II, 1948, 73 & 79, Nos. 1 lines 1 & 2, 8, lines 2-4.

273. ARMT XIX e.g. Nos. 195, 192 etc.

274. ARMT II No. 82, line 22.

275. ARMT VII 256-7, para. 70.

276. CAD unpublished volume M, consulted in draft in Chicago. malāku (cut of meat); AHw 593.

277. Parrot Sumer No. 171B

278. Eisen G.A. Ancient Oriental Cylinder Seals & Other Seals 47, No. 48 Plate VI.

279. Layard I, Plate 75.

280. Layard II Plates 35 & 36.

281. Gadd Stones Plate 29a.

282. Layard I, Plate 30.

283. UE II, 280, Plate 105, PG/789, U.10556.

284. Boehmer Plate 32, No. 387.

285. Moortgat Art No. 288.

286. SACT I No. 171, lines 4-5: ŠU.GID GIR$_4$.TA BA.ŠEG$_6$ MU.AGA.UŠ.E/ NE.ŠE 'for the "general dues"(for the kitchen) were roasted in the oven as provisions for the troops.' CAD Vol.2. B 135-137.

ŠEG$_6$/bašālu: to boil, roast, become roasted etc., to bake to roast meat. In conjunction with GIR$_4$/kīru, (baking oven) it suggests roasting or baking rather than boiling the meat.

287. Van Driel, 92, vii lines 47-48, viii line 2'. Van Driel translated ka-nu-ni as 'hearth' but CAD Vol. 8, K, 393-395 gives kinūnu (kanūnu in Neo-Assyrian) as 'kiln, stove, brazier'. See also Salonen A. Bagh.Mitt.3, 168

288. Van Driel, 94, line 19'.

289. ibid., 202, line 148; 194 lines 8', 12'-20'

290. ibid., 194, lines 8' ff.

291. Layard II Plate 36.

292. SACT I No. 171, lines 1-7

293. Van Driel, 128, v 12' and Oppenheim A.L. & Hartman L.F. 'Domestic Animals of Ancient Mesopotamia...' JNES IV, 1945, 160, line 96, and 161, note 78.

294. Iraq XIV, 43 line 132.

295. CAD unpublished volume M consulted in draft in Chicago. madlute salted: CAD Vol. I/1 A alpu 372, 3. 'Salt beeves'; but note that AHw 666 gives muddulum as a 'kind of meat (with stuffing??)'. If the root of this word is connected with 'filling' then GU$_4$.MEŠ madlute may be rolls of stuffed beef and not salted beef.

297. Dalley et al. No. 79

298. ARMT III No. 29, lines 7, 17 & 21.

299. ARMT XIII No. 32, lines 5-9.

300. Page S.M. Old Babylonian Texts from Rimah, University of London Thesis, 1969, 363.

301. Bauer Nos. 41 iv 9 - v 1 ; 42 v 7 - vi 4; 43 viii 3 - ix 9.

302. Lambert RA 59, 117, No. 7 (Umma); MAD 5, No. 69, i 8. (Kish area)

303. Lambert M. 'La vie economique d'un quartier de Lagash' RA 55, 139, No. 8 & No. 9 (Lagaš); UET III No.102, lines 5 & 6; (see also SACT II No. 247 (Warka) and Eames Coll. E3 (Puzriš Dagan))

304. Gadd C.J. Iraq VII, 1940, 50 A941, 52 A961 & A963 (Chagar Bazar); SLB I/3 81, No. 150 line 9 (SAḪ(?).ḪUŠ - red swine?)

305. e.g. HSS XIII No. 78, 1-2.

306. OIC No.20, 64 & 65, Figs. 50 & 51.

307. Mallowan M.E.L. 'Excavations at Tell Chagar Bazar & Brak' Iraq IX, 1947, Plate XIII no. 9.

308. UET IV, 31 Plate 37, U14459.

309. Mallowan M.E.L. 'Excavations at Tell Chagar Bazar' Iraq IV, 1937, Fig. 10 No. 10.

310. Parrot A. Tello, 251 Fig. 51d.

311. Carter T.H. BASOR, 178 (April 1965), 47-48, and Expedition 7, 1964, No. 1, 39 (picture).

312. Starr Nuzi I, 427-428, 99-100 (thought to be lions here), II, Plate 102 (L2), 104 (A & B), 105 (A1, A2, B), 106 (A).

313. Delaporte Catalogue Louvre II, Plate 72, No. 11 (A.137)

314. VR, 25 and Plate 33, No. 242.

315. Layard II Plate 12a.

316. Gadd Stones, 194 and Plate 42.

317. Maxwell G. Reed shaken by the Wind, 72-73.

318. Lambert BWL No. 215, line 16.

319. ibid., line 18.

320. Gordon Sumerian Proverbs, 143, line 190, 144, line 191. Corrections 515, line 190 & 191.

321. ibid., 132, line 172.

322. Landsberger Jahrezeiten, 274.

323. UE II/1, e.g. 130-133 (PG/1631), 151 (PG/333) and grave contents lists 412-509.

324. Ellison R et al. 'Some food offerings from Ur...' Journal of Archaeological Science, in press.

325. Porada I, Plate XLVIII No. 320e, Plate XLVI No. 300, Plate XLVII No. 305 e. (Old Babylonian /Isin-Larsa)
ibid., Plate CXVIII No. 776 (Neo- Assyrian)
Cylinder Seals, Plate XV c; Porada I, XVII No. 106 e (Early Dynastic)

326. UE II/1, 60 (PG/779), 421, grave contents list (PG/203)

327. UE II/1, 409.

328. Hilzheimer M. Animal Remains from Tell Asmar

329. ibid., 48.

330. Details taken from ibid., 27-46, and Table VIII, 49-51. In some archaeological studies the relative importance of domestic animals in the diet has been calculated by estimating the probable weight of the usable meat coming from animals excavated. This is done by counting the numbers of individuals found in the site; calculating the

live weight by means of similar living modern animals and subtracting the weight of usable meat. It has not been possible to do this for the Diyala region as there is insufficient information on the modern weights of domestic animals kept in similar circumstances to those at Tell Asmar. See for fuller particulars regarding the method of calculating weights and the problems involved: White T.E. 'A method of calculating the dietary percentage of various food animals utilized by aboriginal peoples' American Antiquity No.4,1953 396 ff.; Smith B.D.'Toward a more accurate estimation of the meat yield of animal species at archaeological sites', in Archaeozoological Studies (ed. A.T.Clason), 99ff.

Details of bones found at Tell Asmar:

			No.of Individuals
Cattle			
E.D.III	Early Northern Palace,	variety of bones.	1
Proto-Imperial	Northern Palace. Court: F17:6 & 17:7	left humerous	1
		humerous & thighbones	1
	Single Shrine II/III	left humerous	1
	House VI, Level Va, H:20:8	horn cores	1
First Imperial	J.18:20, House Level IV	ulna	1
First Imp./ 'Inter.Imp.'	J.19.10, IV/III	ulna	1?
Inter-Imperial	K.119:2, Room in House II, level III	phalanx	1
Sheep/Goat			
EDIII	Single Shrine I (annex D17:2)	various body bones	1
	Early Northern Palace, D15: 14 & 15:23	various bones, teeth, goat horn core.	2+
Proto-Imperial	Northern Palace F17:7	radii from 2 diff.aged animals + other bones.	2
	Single Shrine II/ III, 17:1	jawbones & other bones	1 +
	H.20:3 House VI Level Va	2 left horn cores	2
First Imp./ Inter.Imp.	J.19:10, House area, levels IV/III	2 fragments of left jawbones	2?
Inter-Imperial	J.19: Level III House II	pelvis	1

Pigs

EDIII	Single Shrine I	jawbone	1
	Early Northern Palace E.15:23, room below E.15:1	lower left & right jawbone	
		Remains of at least 2 young pigs.	2+
	House area below J.20:16 Level V.	jawbone	1
Proto-Imperial	Northern Palace E.16:18	humerous	1
		skull + extremial bones.	1 (whole farrow)
	Court F17:6	2 right jawbones	2
	Street E of North.Pal. F.15:9	skull	1
	Room, House VI, Level Va	jawbones etc.	1
	Single Shrine II/III D17:1	jawbone etc.	1
First Imp./ Inter-Imp.	House Levels IV/III	2 upper jawbones	2
Isin/Larsa	Gimilsin Complex, Bililama level.	skull	1
	S.of South.Palace, P.34, Street.	symphsis.	1

Comparison

	Cattle	Sheep/goat	Pigs
EDIII	1	3+	4+
Proto-Imperial	4	5+	7
First & Inter Imperial	2/3	2/3	2
Isin/Larsa	-	-	2

331. Starr Nuzi I 492-493.

332. ibid., 181, 199 & 493.

333. ibid., 492.

334. Bökönyi S. 'The Fauna of Umm Dabaghiyah: a preliminary report' Iraq XXXV, 1973, 9-11.

335. Moortgat Art Plate 14.

336. ibid., Plate D2 & 4, E1, Plate G 9 & 10, Plate K 1.

337. Barnett R. Assyrian Palace Reliefs, Plates 90 & 91 ff.

338. Harrison D.L. The Mammals of Arabia II, 331.

339. ibid., 336.

340. Moortgat VR, Plate 1 No. 1; note that van Buren identified this as ibex, Fauna in Ancient Mesopotamia 50-51, & Fig. 10

341. VR Plate 11, Nos. 65 & 67.

342. Cylinder Seals Plate XII C.

343. Boehmer Plate LXI, Fig. 721.

344. Opitz D. 'Die Siegel Ninurta-Tukul-Aššur und seiner Frau Rimeni' AfO X 1935,36, 49, Fig.4.

345. Mallowan M.E.L. & Davies L.G. Ivories in the Assyrian Style Plate XXXV No. 142.

346. CAD Vol. 16, Ṣ sabītu gazelle, 42-44.
Salonen A. Jagd und Jagdtiere im alten Mesopotamien 213-216, 255-258.

347. Kirkbride D. 'Umm Dabaghiyah: a fourth preliminary report' Iraq XXXVII (1975), 9, and Bökönyi S. 'The Fauna of Umm Dabaghiyah, a preliminary report' Iraq XXXV,1973,9-11

348. SACT I - taken from the dates on texts, e.g. No. 136, 7.

349. ibid., No. 134, 4-5.

350. Eames Coll. W.62, Puzriš-Dagan, Amar-Sin, 1st month of the 9th year.

351. ibid. Puzriš-Dagan, F.10, Šulgi, 4th month of 42nd year; C2, Umma, Šu-Sin, 1st-12th month of year 8.

352. AOAT.I Nos. 15 & 29: Gadd C.J. Iraq VII, 1940, 53, No.1965.

353. Iraq XIV, 42, lines 110

354. Hilzheimer M. Animal remains from Tell Asmar, 22.

355. Hatt R.T. The Mammals of Iraq, 72.

356. Harrison D.L. The Mammals of Arabia 349.

357. Moortgat A. 'Assyrische Glyptik des 13.Jahrhunderts' ZA(NF) XIII (47), 1941, 54, Fig. 4.

358. Moortgat Art No. 242.

359. Barnett R.D. Assyrian Palace Reliefs Plate 102.

360. Parrot Sumer No. 11.

361. Mallowan M.E.L. and Davies L.G. Ivories Assyrian Style Plate XXXIV No. 141, Plate XXXV No. 144 & 146.

362. Harrison D.L. The Mammals of Arabia, 65ff, 69.

363. UE I Plate 6.

364. Parrot Sumer No. 199

365. ibid., No. 119.

366. ibid., No. 162.

367. ibid., No. 361, see also Parrot A. Le Palais: Documents et Monuments, 35 & Plate XVIII No. 1032.

368. Gadd Stones Plate 39.

369. Hatt R.T. The Mammals of Iraq , 64.

370. Moorgat A. ZA (NF) XIII, 1941, Fig. 29 66, and Fig. 46, 72

371. Barnett R. Assyrian Palace Reliefs Plate 2.

372. Mallowan M.E.L. & Davies L.G. Ivories in Assyrian Style Plate XXXV, No. 142 & 143.

373. Barnett R.D. Assyrian Palace Reliefs, Plate 101, Nineveh. (This method is reminiscent of the one used at Umm Dabagiyah for hunting onagers, c.6000 - Kirkbride D. 'Umm Dabighiyah; fourth preliminary report' Iraq XXXVII, 8-9) Note that Van Buren, Fauna in Ancient Mesopotamia , 40, identified these as red-deer.

374. Hilzheimer M. Animal remains from Tell Asmar, 20 & 49. Dates are not given for the Warka and Tell Halaf antlers.

375. Mallowan M.E.L. & Davies L.G. Ivories in Assyrian Style Plate XXXIV No. 140. Note however that there is dappling on the coat and it may therefore be some sort of fallow deer.

376. Gadd Stones Plate 6.

377. ibid., Plate 1B

378. SACT I No. 136, 1-2.

379. see also Eames Coll. L.17

380. CAD Vol. 9, L. lulīmu 1) red deer, stag, 241; Salonen A. Jagd und Jagdtiere..., 210-212.

381. e.g. Eames Coll. H37 and E5; and SACT I No. 175.

382. Calvot D. 'Deux Documents inedits de Šelluš-dagan' RA LXIII, 1969, A)19550 and A) 19548.

383. SET No. 86 (only monthly summaries given due to the fragmentary nature of the text.)

384. CAD Vol. I/1, A. ajjalu stag, deer, 225-226; Salonen A. Jagd und Jagdtiere..., 159-162.

385. AOAT I No. 22, lines 6 & 7.

386. Iraq XIV, 42 line 110.

387. CAD Vol. I/2 arnabu hare, 294; Salonen A. Jagd und Jagdtiere..., 181-182.

388. Van Buren, E.D. Fauna in Ancient Mesopotamia, 26-28 and fig. 31.

389. Moortgat Art No. 273.

390. Layard II Plate 9a.

391. CAD Vol. I/2 asu B, bear, 344: Salonen A. Jagd und Jagdtiere..., 182-184.

392. SACT I No. 23.

393. e.g. SET No. 86, Month 1, 2 AMAR.AZ, Month 6 1 AZ passim.

394. ARMT VII No.91, lines 1 & 2.

395. CAD Vol. 4, E erbu locust, 256-258.

396. Doughty C. Travels in Arabia Deserta I 203-4, 336.

397. CAD Vol. 4, E erbu, 257 (YOS 215:27).

398. ibid., 257 (CT 29 11a: 7-9)

399. ARMT III No. 62, lines 15-17.

400. Layard II, Plate 9.

401. UET III No. 1303, line 1. Fish as food for servants. - ARMT IX No. 251 (fish for king's meal) Rev.1? 1-8. Waterman L. Royal Correspondence of the Assyrian Empire No. 1405, line 5. (include as food for an illness).

402. BBSt, 124, No. XXXVI v, line 1.

403. Lloyd S. & Safar F. 'Eridu' Sumer III, 1947, 94, 104-5,

404. See also Van Buren E.D. 'Places of Sacrifice...' Iraq XIV, 1952, 76, and 'Fish Offerings in Ancient Mesopotamia' Iraq X, 1948, 103.

405. Heuzey L. & Thureau-Dangin F. in Cros G. Nouvelles Fouilles de Tello I, 82.

406. Van Buren E.D. Iraq X, 1948, 105.

407. U.V.B. VI, 1935, 12.

408. UE IV, 82.

409. Ellison R et al. Journal of Archaeological Science, in press.

410. UE II, 410, PG/610 & PG/1232.

411. e.g. UE II, 148, PG/55, 65 PG/789.

412. Field H. 'Fish at Jemdet Nasr and Kish' Field Museum News May 1932, 26; and 'Fish in Mesopotamian "Flood Deposits"' Man 75, March 1936.

413. e.g. Grave 9, Mackey E. Report on the Excavations of the 'A' Cemetery at Kish, 15 and A Sumerian Palace and the 'A' Cemetery at Kish, 152.

414. Hilzheimer M. Animal Remains from Tell Asmar, 46 and 49-51

415. Personal communication from R.C.Haines, 11th March 1975.

416. Boessneck J. 'Fierknochenfunde aus Nippur' Oriental Institute campaign of 1973 at Nippur, to be published.

417. Personal communication from J. Boessneck, 8th January 1976.

418. Ellison R. et al., Journal of Archaeological Science in press.

419. de Genouillac H. Fouilles de Tello I, 89-90, and Plate 50, 2a and 2c.

420. Mackey E. A Sumerian Palace and the 'A' Cemetery at Kish 166, Plate LXI No. 15 and No. 6.

421. O.I.C. 13, 91-93, Figs. 41-42.

422. Frankfort H, Lloyd S and Jacobsen T. The Gimilsin Temple and the Palace of the Rulers at Tell Asmar, Fig. 106g.

423. UE IV, Plate 30, e.g. U14461, U14497, U14969, U14447, U19875, U.14923, U.14439, U.14924.

424. UE II Plate 230, U 8672.

425. ibid., Plate 230, U 17926 (PG/850, Burial 9), U 9004 (in inhumation grave near PG/494, near ground surface.)

426. UE II/1, 160, II/2 Plate 154.

427. UE VIII Plate 36 (note that spear-heads found at Ur have not been included as fishing implements because they could be used for hunting as well as fish-spears.) U16215 A, U 161215 C.

428. McCown D.E. & Haines R.C. Nippur I, Temple of Enlil... Plate 153, Nos. 16 & 17.

429. Amiet P. La Glyptique Mesopotamienne Archaique Plate 13 bis G

430. Amiet P. Glyptique Susienne, 78 Plate 14 No. 622.

431. VR Plate 22, No. 146.

432. Parrot A. Tello, 94, Fig. 22a.

433. ibid., 252 and Fig. 53d.

434. UE III Plate 16, Nos. 303 (SIS4-5), No. 302(SIS 4) The man is carrying one pair and one trio of fishes.

435. Parrot Sumer No. 177.

436. UE II, Plate 142, U.10945 & U 10944.

437. Boehmer Plate XXIV No. 280

438. ibid., Plate XLIV No. 525.

439. Barnett R.D. and Faulkner M. Sculptures of Aššurnaṣirpal II... Place CXX

440. Layard I, Plate 67b.

441. Barnett R.D. Assyrian Palace Reliefs, Plate 118.

442. Botta P.E. & Flandin E. Monument de Ninive V, Plates 33 & 34

443. Paterson A. Palace of Sinacherib, Plate X

444. Bauer Nos. 132-151.

445. UET III No. 1294, lines 1-18

446. Boyer Contribution, 33.

447. ARMT I, No. 89, 7.

448. ARMT I No. 139, 5.

449. ARMT IX No. 250, 1-4.

450. ARMT III No. 9, 9

451. Dalley et al. No. 42, lines 8, 14, 20 & 21.

452. Iraq Handbook, 204-205

453. Khalaf K.T. The Marine and fresh-water fishes of Iraq, 28

454. ibid., 32.

455. Salonen A. Die Fischerei im alten Mesopotamian, 160-166
This book covers the textual evidence for fish in Mesopotamia in detail.

456. Bauer Nos. 135 lines i 3 & iii 3 (480 and 9600 fish); 148 ii 1 (60 fish)

457. Eames Coll. E.34, ii 1-7.

458. ARMT IX No. 251, 1

459. Salonen A. Die Fischerei..., 212-221; AHw 880

460. Civil M. 'Home of the Fish' Iraq XXIII, 1961, 170

461. ibid., 161, line 69.

462. Bauer Nos. 134 iv 4 (50 fish), 135 i, 1 (15 fish) and 148 i 1, 3, 5, ii 3. (250 fish)

463. UET III No. 1294

464. Eames Coll. G15.

465. ARMT IX No. 250 line 13.

466. Boyer Contribution 33 ☐ 113, line 12.

467. Khalaf K.T. Marine and fresh water fishes..., 28-29
Salonen A. Die Fischerei... Plate XXXIX, 1.

468. Khalaf K.T. Marine and fresh-water fishes..., 32;
Salonen A. Die Fischerei... Plate XXXIX, 2.

469. Parrot Sumer No. 343

470. ANEP, 223, No. 706, 216 No. 665.

471. Salonen A. Die Fischerei..., 179; AHw šaḫû, 1133.

472. Khalaf K.T. Marine and fresh-water fishes... 108-9.

473. Bauer No.146 i 1, ii 1, vi 1 (4660), No. 134 v 5 (4380) No. 140 i 1, 4 (1380) etc.

474. Khalaf K.T. Marine and fresh-water fishes..., 123-124.

475. Bauer No. 134, i, 3 passim, No. 144 i 1, ii 2, No. 149 ii 3.

476. Khalaf K.T. Marine and fresh-water fishes... 72.

477. Salonen A. Die Fischerei..., 228-232.

478. e.g. Bauer Nos. 133, i 3, ii2 & 8 passim (8520), 146 i, 2, ii 5 (2160), 136 i2, ii 5 (960); Pinches Amherst No. 1, 1, 4 passim.

479. Salonen A. Die Fischerei... 150, 228, 232.

480. Civil M. Iraq XXIII, 1961, 160, lines81-83.

481. MSL 8/2, 85, 96, 101, lines 11-3.

482. ARMT IX No. 250, line 2.

483. Salonen A. Die Fischerei..., 151-156.

484. Khalaf K.T. Marine and fresh-water fishes..., 17-18.

485. Bauer Nos. 133 iii 2, 131, ii 3, 149 ii 4, iii 1; ITT/I 1083 R.line 2; ITT II/2, 4361, 4449 (catalogue only); Pinches Amherst No. 1, ii 2 passim.

486. UET III No. 1294, i 11.

487. Khalaf K.T. Marine & fresh-water fishes..., 148-149.

488. Paterson A. Palace of Sinacherib Plates X & XIV

489. Khalaf K.T. Marine & fresh-water fishes..., 57.

490. MSL 8/2, 87.

491. Salonen A. Die Fischerei..., 197.

492. ARMT IX No. 250, line 4.

493. Salonen A. Die Fischerei..., 198-9.

494. Chambers Encyclopaedia Vol. XIII, testudines, 549b-50a.

495. Salonen A. Die Fischerei... Plate XII, No. 4.

496. ibid., Plate XIII, No. 1.

497. ibid., Plate XII No. 8

498. Paterson A. Palace of Sinacherib Plate X; Gadd Stones Plates 9 & 14.

499. Salonen A. Die Fischerei... 167-68, 214, 235; AHw raqqu 958, šeleppû 1210.

500. Bauer No. 133 i 6, iii 3.

501. Boehmer No. 280, Plate XXIV.

502. Gadd Stones Plate 14; Paterson A. Palace of Sinacherib Plate X.

503. Details of preservation methods from Food Industries Manual Drying, 345, Salting, 390, Smoking 393.

504. FAO Fish in Nutrition, 38.

505. e.g. Bauer Nos. 133 DAR.RA i, 4, MUN i 5 passim, 133 DAR.RA i 1-4, 136 DAR.RA i 4-5.

506. Bauer No. 134 ii 2.

507. see for example GIR.KUGin Bauer No. 133, i 4-5.

508. ibid., No. 134 i 5 and p.381, No. 135 ii3, iv 1.

509. CT 50 No. 154 lines 1, 3 - 5.

510. Eames Coll. G.15.

511. For discussion see Salonen A. Die Fischerei ..., 193-4.

512. UET III No. 1294, line 18, No. 1303 line 1.

513. Eames Coll. G.15.

514. Lambert M. 'Textes Commerciaux de Lagash' RA 47, 1953, 64, XI (VAT 4762), 66 X5 (DP332) & 116, LA5 (VS 14, No. 64) LA 5 (DP 322). Lambert takes DAR.RA as fendus - split, and SU+SU as dépouilées ?skinned.

515. Dalley et al. No. 130 line 7 and No. 42 .

516. Waterman L. Royal Correspondence of the Assyrian Empire, I No. 568, 9-10, 20-21, 3', 4', 6', 8'-11'. Altogether 10? lamkartu-vessels, 34 strings of fish and 2400 fish are listed in details of receipts for the palace and for members of the Royal family;
B. Parker 'Administrative tablets from the North West Palace, Nimrud' Iraq XXIII, 1961, 42, ND 2672, lines 26-27, Plate XXII. 3 lamgate-jars and 1000 fish are included in year tribute with horses from Girzanu, Nisibin, and Askelon, but it is not clear whether the fish are from the same area as these horses. Note also that fish form part of the provisions for Aššurnaṣirpal's feast (Iraq XIV 43, line 114)

517. Amiet P. Glyptique Susienne Plate 148, No. 624 78, Plate 194 195 No. 2316.

518. see also Crawford H.E.W. 'Mesopotamia's invisible exports in the third millennium BC' World Archaeology 5, 1973, 233-235.

519. see quantities such as 4380 GIR.KU$_6$. A.DÉ (Bauer No. 134 v 5) and ŠE.SUḪUR.KU$_6$ (Bauer No. 134, v 4.) 1560.

520. see Waterman L. Royal Correspondence of the Assyrian Empire No. 568, lines 9-10, 20-21, 3'-4', 6', 8'-11'; Parker B, Iraq XXIII, 1961, 42 ND 2672, lines 26-27 and Plate XXII.

521. Hilzheimer M. Animal remains from Tell Asmar, 49-50.

522. Boessneck J. 'Tierknochenfunde aus Nippur' Oriental Institute campaign of 1973 at Nippur. To be published.

523. Peters J.P. Nippur or explorations and adventures on the Euphrates II, 123.

524. OIC No. 20, 64-65, Figs 50 & 51.

525. Bauer No. 176 vi 13, ix 2, xi 5.

526. ibid., No. 177 v 10.

527. Thureau-Dangin F. Inscriptions de Sumer et d'Akkad, 128 lines 8-11,

528. UET III No. 102, lines 4, 8-10.

529. SACT No. 58, 61.

530. ARMT IX No. 251, Rev? 2-8.

531. AOAT I Nos. 15, 4; 29, 4; 40, 13.

532. Iraq XIV, 34, lines 111 ff.

533. Delaporte Catalogue Louvre I, Plate 34, No. 10 and Plate 50 No. 13.

534. Moortgat VR Plate 78, No. 654.

535. Porada I, Plate CIV No. 700

536. Salonen A. Vögel und Vogelfang im alten Mesopotamian Plate LXXVIII

537. Layard II, Plate 9a.

538. Personal communication from Grace Goodell, anthropologist at Columbia University. (6th February 1976)

539. Salonen A. Vögel und Vogelfang... , 216-222; CAD Vol. 8 K. kurkû goose, 561-63.

540. Woolley C.L. 'Excavations at Ur 1925-26' Antiquaries Journal VI, 1926, Plate LII b, 381; for another depiction of a goose (in Early Dynastic III) see Cylinder Seals Plate XVk)

541. Parrot A. Tello, 239 and Fig. 49c.

542. Salonen A. Vögel..., 237-240; AHw paspasu 839.

543. Van Buren E.D. Fauna in Ancient Mesopotamia 94-95.

544. Strommenger E. & Hirmer M. Art of Mesopotamia, Plate 155.

545. Salonen A. Vögel... 250-258.

546. Moortgat Art Plate 124.

547. Salonen A. Vögel... 241-243. It should be noted that both AHw 892 qadû I, and CAD Vol. I/1 A akkû 275 take this to be a kind of owl.

548. Survey of Iraq Fauna reprint from Journal of the Bombay Natural Historical Society, Iraq Government, 1918-1923, 387.

549. ibid., 386.

550. Salonen A. Vögel..., tarru 151-153; AHw 1331. tarlugallu: Salonen A. Vögel... 154-56; AHw 1330; CAD Vol. 8 K kidurrānu (a crested bird), 494; Personal communication from Dr.S. Dalley (28th February 1978)

551. Personal communication from I.J.Gelb, September 1975. cf. CAD Vol. 16 Ṣ ṣulāmu, 238.

552. WVDOG 65, 135 Abb. 161, and Plate 29.

553. Ravn. O.E. A Catalogue of Oriental Cylinder Seals and Impressions No. 159.

554. VR No. 755, Plate 88.

555. Darby W.J., Ghalioungui P, Grivetti L. Food: the Gift of Osiris, 301.

556. Boessnek J. & von den Driesch A. 'Tierknochenfunde vom Korucutepe bei Elizig in Ostanatolien' in Koructepe (ed. M.N. van Loon), 120-122.

Pages 181-187

557. Kon S.K. Milk and milk products in Human Nutrition 1-3
Note that milk is low in iron and Vitamin D.

558. Musil A. The Rwala Bedouins 87 ff.

559. Kon S.K. Milk and milk products... 7-10.

560. Main sources: Kon S.K. Milk and milk products....;
Davidson, Passmore and Brock; Food Industries Manual, 461-647

561. Susa: Parrot Sumer No. 107; Khafajeh: sheep/goats:
Frankfort F. Stratified Cylinder Seals, Plate 31, No. 315;
Kish: sheep: Moorgat Art No 40; al 'Ubaid: cows: UE I
Plate XXXI, 91; see also Amiet La Glyptique Mesopotamienne
Archaique cows: Plate 87, No. 1148; goat: Plate 87,
No. 1146; Ur: cow?: UE VI, 54, Plate 45f.

562. Cylinder Seals Plate VIII f & d; Porada I No. 13.

563. Cylinder Seals Plate XXIV g & h; Moortgat Art Plate F6.

564. Cylinder Seals, 139.

565. e.g. Early Dynastic: Bauer No. 67, i4, 5, ii 3, 5;
Ur III: Eames Coll. E24 (Umma); UET III No. 377, 1, 4 (Ur);
Old Babylonian: UET V Nos. 737, 1-2, 5-6 etc., No. 783, 786 -
see Figulla (Iraq);
Neo-Assyrian: Parola S. Letters from Assyrian scholars to
Kings Esarhaddon and Assurbanipal, No.218, 14.

566. e.g. Agade: MAD 1 No. 89 (Asmar);
Ur III: TCS I No. 21, 3; 57, 4-5; & 169, 5, 6 & 11.
Old Babylonian: UET V Nos. 510, 1 ff; 511, 1ff; 509, 1. (Ur)
ARMT XII No. 541, 10; 548, 7. (Mari)
Neo-Assyrian: Iraq XIV, 43, line iii, 130-131. (Nimrud)

567. CAD Vol. 6, H. himěṭu ghee 189-190.

568. TCS I, 133,No. 57, 4.

569. Ur III: Ur: UET No. 1214: 23 AB: Ì.NUN in totals (rev.i 7
& ii, 17);
Gelb I.J. 'Growth of a herd of cattle in ten years' JCS 21,
1967, 64-9. In TCL II No. 5499, Gelb has calculated the
cows produce sufficient milk for about 5 SÌLA 'ghee' and
7.5 SÌLA cheese a year. In UET No. 1214, Gelb has
calculated that the annual output per cow is 5 SÌLA 'ghee'
and 5 SÌLA cheese.
Kassite: Nippur: BE XIV No. 99a (Torczyner Tempelrechnungen
No. 21).
This text gives details of cows (with male and females)
together with the amount of Ì.NUN 'produced' by each group
of cows. If only the adult cows are counted, the average
Ì.NUN per cow is .9 SÌLA - there is a slight variation
between the groups of cows. It is not clear whether
these returns are annual (in which case the amounts
involved are small) or whether the Ì.NUN is produced by

all the mature cows in each group. Ì.NUN is produced by the cows and is not an issue to the herdsman. (The text also gives the numbers of sheep and goats and the weight of wool produced.)
It takes about 25-30 parts of milk (Chambers Encyclopaedia Vol.2, butter, 723 b.) to produce 1 part of (modern) butter so presumably 25-30 SÌLAS of milk might be needed for each SÌLA of butter and more for a SÌLA of ghee - because of the second loss of liquid in preparation - but it would be very risky to calculate milk output of the cows on this basis.

570. see e.g. Old Babylonian: Figulla (Iraq) - where it is one of the most frequent food offerings in the Ningal Temple at Ur.
Mari: ARMT IX No. 193, ii 16, 26, iii 14 passim., including issues of the king's meals.
Neo-Assyrian: Nimrud: Iraq XIV, 43, line iii, 218.

571. Early Dynastic: Lagaš: Bauer No. 119, i 3, where it is included with various scented oils from trees and plants to mix as an ointment or salve for Baragnamtara.
Old Babylonian: Mari: ARMT XI No. 191 1 & 3, where it is given to the king's daughter for annointing.

572. BE XIV No. 138, 1 passim. (Torczyner Tempelrechnungen No.53): 1 BAN Ì.NUN and 5 SÌLA Ì.NUN given to adult men and boys per year in the measure of the oil ration (GIŠ. BAN 10 SÌLA Ì.BA)

573. Philby H.St.J The Heart of Arabia, 6.

574. AHw 1253, GA/šizbu: milk.

575. Figulla (Iraq) e.g., 91, No. 7, line 2.

576. e.g. SACT I No. 67, 1-3.

577. Bauer No. 67, ii5; No. 68 x 2.

578. ibid., No. 177 xi 4.

579. ibid., No. 156 i2, 6 passim.; CAD Vol. 3 D diktu, a dairy product 138-139.

580. Frankul W. & Pellett P.L. 'The nutritional value of kushuk' Proceedings of the Nutritional Society 18, 1959, xxxvi-xxxvii

581. UET III No. 1067 obv.ii 15-18; No. 1214 obv. ii 6-8; No. 1215 rev. vii? 16-17; No. 1216 rev. iii 13-15; where GA is translated as 'skim milk' of cheese, and GA.SIG$_7$.A as 'green cheese'.

582. Figulla (Iraq), 120 No. 50 16-17 and note 1; No. 51 13-14, 25-26. Figulla gives GA.SIG$_7$.A as 'yellow, green or skimmed milk'.

583. Eames Coll., Index, 232.

584. Pinches Amherst No. 10 rev.3.

585. UET III No. 1215 rev.ii, 5; No. 1216 rev.iii, 14.

586. Figulla (Iraq) No. 7 and following.

587. ibid., No. 17 line 16: 1 PI 4 BÁN * 2½ SÌLA 5 GÍN ghee;
1 PI 4 BÁN 2 SÌLA 5 GÍN GA.HAR

588. SET No. 188 i 15-16.

589. GA.ŠE.A is also recorded in Early Dynastic, Lagaš, Bauer No. 177, xi 3.

590. Iraq XIV, 43, col. iii 128, 130-131.

591. AfO 18, 329, line 120.

Pages 187-197.

592. Sources for these remains are:
Ur: R.Ellison et al. 'Some food offerings...' Journal of Archaeological Science in press.
Tell Taya: Waines J.G. in 'Tell Taya (1972-73): summary report' (J.R. Reade) Iraq XXXV, 1973, 185-187.
Tell Bazmosian: Helbaek H. 'Isin/Larsa and Horian Food remains....' Sumer XIX, 1963, 27-33.
Tell Qurtass: Helbaek H. 'Ancient crops in the Shahrzor Valley...' Sumer XVI, 1960, 79-81.
Khafajeh: Diyala Report, 10-18.
Nuzi: Starr Nuzi I, 493.
Nimrud: Helbaek H. in Mallowan Nimrud, II, 613-620.

593. Note that the lentils and chickpeas at Bazmosian, Isin/Larsa and 15th century levels were mixed with sizeable quantities of barley, bread wheat, emmer wheat; the chickpeas were less common than grain at Nuzi; and the vegetable remains at Nimrud were also less common than barley, bread wheat and emmer wheat.

594. Jones H.A. and Martin L.K. Onions and their Allies, 24-25, 31-39.

595. AHw 1155 šamaškillum onion; AHw 1275 šūmu garlic; DAB 53-54; CAD Vol. 8 K karašu B leek 212-214.

596. Gelb I.J. 'Philadelphia Onion Archive' Studies Landsberger 57

597. Lagaš: Bauer No. 4 iv 2 - vii 8: SUM.SAG$_5$, SUM.ZA.ḪA.TI, SUM.SIKIL.GAL.GAL, TUD.SUM.SIKIL, SUM.GUD.
Bauer No. 69 i1 - ii 4: SUM.SIKIL.GAL.GAL, SUM.GUD, SUM.DILMUN, TUD.SUM.SIKIL, SIM.ZA.ḪA.TI.
Umma: Lambert RA 59, 123 No. 42: SUM.ZA.ḪAT.TI, SUM.TUD.DA, SUM.GUD.
Nippur: Gelb I.J. Studies Landsberger, 57, SUM.GAZ. SUM.SIKIL.SAR.
Umma?: Eames Coll.S23: SUM.GAZ, SUM.SIKIL.SAR, SUM.ḪAD.DIN
Lagaš: Pinches Amherst No. 54, 7: GA.RAŠ.
Rimah: Dalley et al. No. 28, 6. ḫazannu
Larsa?: Boyer Contribution 27, 111 HE lines 13-15: SUM.SAR ZA.ḪA.TIN.SAR, SUM.SIKIL.LUM.SAR.
Mari: ARMT IX No. 238 1 & 9, XII No. 733, 1 & 6: šamaškillum, ḫazannu.
Nimrud: Iraq XIV 43, lines 125-127, 136: SUM.SAR, SUM.SIKIL. SAR, kuniḫḫu, andaḫšu
Waterman L. Royal Correspondence of the Assyrian Empire No. 1405, 5. SUM.SAR, SUM.SIKIL.SAR.

598. Bauer No. 4, iv 1 - vii 8.

599. Bauer No. 69, i3 & ii 4.

600. Dalley et al. No. 29, šābultum = dried, ratbutim = undried- in the sense , opposite to šābultum, of 'not dry' or 'fresh' rather than 'moist'.

601. CAD Vol. I/2, azannu bitter garlic, 526.

602. Jones H.A. and Martin L.K. Onions and their allies, 215 & 134-135.

603. see Gelb I.J. Studies Landsberger, 60, unpublished texts.

604. SET Nos. 202-232; Eames Coll. A3, B5, E16, G12.

605. ARMT XII No. 734, 1 7 2, No. 733, 6; ARMT IX No. 238, 7-9; ARMT XII, 7 and note 7. ZA.ḪA.TI(SAR)/suḫatinu.

606. ARMT XII No. 729 1 & 2.

607. Dalley et al. No. 29, 10; No. 129, 5 passim.

608. Waterman L. Royal correspondence of the Assyrian Empire No. 1405, 5. ŠUM, karašu.

609. Iraq XIV 43, lines 125-7, 140. kuniphu is translated as a pungent garden plant. CAD Vol. 8 K, 539; zinzime as a type of onion, CAD Vol. 21, Z zimzimmu (a type of onion) possiby a shallot, 122.

610. CAD Vol. 6 H ḫallūru chick pea, 47-48.

611. CAD Vol. 8 K kakkû lentil (or small bean), 58.

612. Bauer No. 4 iv 5, v 6; No. 70 i2, iv 3, v 1.

613. Bauer No. 4

614. UET V No. 573 (headings)

615. U.NAP.HI has been translated as Chrysantheum segetum or Ch.coronarium possibly used in the same way as Chamomile. DAB 120-125.

616. BE XIV No. 18 (Torczyner Tempelrechnungen No. 1), headings The quantities of šibšum and miksu taxes include ŠE (see Ellis Agriculture, 110, 152)

617. Pinches Amherst No. 69 i 7, ii 14, iii 12, iv 2.

618. e.g.ARMTIX Nos.215, 214, 193, etc. passim.

619. e.g. ARMT XII Nos. 70, 4-5; 107, 7; 180, 8-9; 181, 5-6; 249 6-7; ARMT XII, 7 na-GA-BI 'descicated, dried' from the root ngb to dry, as in the desert Negeb.

620. see Note 123 in Chapter 4, and Dossin G. Les noms d'années et éponymes dan les 'Archive de Mari'.

621. ARMT XII No. 696, lines 3 & 14.

622. e.g. The year Zimri-Lim counted the people:
Liliatum: ARMT IX No. 85 (kakkû), No. 87 (ḫallūrum);
Bēlēt-biri: ARMT XI No. 377 (ḫallūrum), ARMT XII No. 380 (kakkû);
Kiskissum: ARMT IX No. 98 (ḫallūrum), ARMT XI No. 98 (kakkû)
Eburum: ARMT IX No. 109 (ḫallūrum), ARMTXII No.143 (kakkû)

Uruḫum: ARMT IX No. 109 (ḫallūrum)
Malkanum: ARMT IX No. 114 (ḫallūrum)
Abum: ARMT XII No. 438 (ḫallūrum) ARMT XII No.441 (kakkû)
Ḫibirtum: ARMT XII No. 445 (ḫallūrum & kakkû)
Dagan: ARMT XII No. 466 (ḫallūrum & kakkû)
The Year Zimri-Lim built Dur Yaḫdun-Lim:
IGI.KUR: ARMT IX No. 181 (ḫallūrum)
Laḫḫum: ARMT VII No. 158 (ḫallūrum), ARMT XII No. 572 (kakkû)
Kinûm: ARMT XI No. 247 (ḫallūrum)
Malkanum: ARMT XII No. 548 (kakkû)
So that taking the two years together ḫallūrum appears in Liliatum, Bēlēt-biri, Kiskissum, Eburum, Uruḫum, Malkanum, Abum, Ḫibirtum, Kinum, Dagan, Laḫḫum, IGI.KUR (12 months); kakkû appears in Liliatum, Bēlēt-biri, Kiskissum, Eburum, Abum, Ḫibirtum, Dagan, Laḫḫu, Malkanum. (9 months)

623. e.g. ARMT XII No. 363, 6.

624. CAD Vol. I/2 A appānu (a leguminous plant) 179

625. Dalley et al. No. 191, 1-2; No. 192, 1.

626. AOAT I No. 11, 7 & No. 25, 7.

627. Figulla (Iraq) e.g. No. 18, lines 25 & 27, Ú.EZINU is translated as 'lentils'. The signs are Ú.ŠE.TIR: ŠE.TIR is connected with the deity Ašnan, a cereal deity DAB 96, which could mean that ŠE.TIR is a cereal rather than a legume - see also CAD Vol. I/2 A ašnan 450-52.

628. Brouk B. Plants consumed by man, 103

629. Platt B.S. Foods used in tropical countries No. 105.

630. DAB 56.

631. Pinches Amherst No. 69 i 3, iii 2-3, iv 11.

632. HSS XIV No. 69, Plate 36 1, 7-10.

633. Postgate Archives No. 183, 3.

634. Iraq XIV, 43, line 126.

635. Brouk B. Plants consumed by man, 104-105.

636. Ú.NAB.ḪI appears to take the place of ZAG.ḪI.LI as a field crop at Ur in the Old Babylonian period.

637. DAB 81-82. Note that Thompson does not give the diacritical- this is given in Labat Manual No. 550.

638. An.Or. 2 7-8, 1) DP 124.

639. A possible reference appears at Ur III Ur in a list of provisions for Ibbi-Sin, year 4: UETIII, No. 96, 3, 1. GIR.LAM A.UKUŠ(ḪUL).

640. DAB 84.

641. Brouk B. Plants consumed by man 186 & 202.

642. Layard II Plate 8, but note that Bonavia E. Flora of the Assyrian Monuments, 68, Fig. 30, identifies this as a citron.

643. DAB 51; CAD Vol. 9, L laptu A, 96.

644. CAD Vol. 9, L laptu A, 96 - see TCL 18,87:21 & TLB 411:41.

645. Iraq XIV, 43 line 126.

646. Meissner B. 'Babylonische Pflanzennamen' ZA 6, 291 iii 295 .

647. Brouk B. Plants consumed by man, 68.

648. Layard II, Plate 9b; Bonavia E. Flora of the Assyrian Monuments, 66-67.

649. nassabu in CT 14, 50, 43 (ZA 6) translated as artichoke in Levey M. 'Food and its technology in Ancient Mesopotamia' Centaur 6, 1959, 42.
see also DAB 83 and AHw nassabu757-758

650. Iraq XIV, 44 line 139.

651. DAB 72.

652. e.g. AfO 18, 329 line 85; Meissner B. ZA 6, 293 hi-is; CAD Vol. 6, H hassū lettuce, 128.

653. Aykroyd W. & Doughty J. Legumes in Human Nutrition, 43-45, 61-66; Davidson, Passmore & Brock, 178-184, 211-14, 280.

Pages 198-204

654. Lagaš: CT 50, Plate 47, No. 174 3 & 4: Ì.ŠAḪ. & Ì.UDU
Umma: Lambert RA 59, 121, No. 32, 7. Ì.ŠAḪ
Asmar: MAD 1 No. 287, 3. Ì.ŠAḪ
Lagaš: Pinches Amherst, No. 105, rev. 3. Ì.UDU
RA 58, 104, No. 75 1. Ì.ŠAḪ
'Ešnunna': AASOR 31, LE 1, 2. Ì.ŠAḪ
Ur: UET V No. 508, 6, 8, 10. Ì.ŠAḪ
Chagar Bazar: AOAT I, No. 6 1& 4 Ì.ŠAḪ
Rimah: Dalley et al. No. 204, 3, 4, 12, 15, 17 & 18. Ì.ŠAḪ & Ì.UDU
Nippur: BE XIV No. 48 line 18. Ì.UDU
Postgate taxation 336, ADD 1095, 10. Ì.ŠAḪ

655. Lambert RA 59, 117, No. 8 4 & 5.

656. AASOR 31, 'Laws of Ešnunna' Nos. 1 & 2.

657. Bauer No. 117, e.g. iv 1 & 2.

658. Bauer No. 133, iii 4, No. 135 iii 1.

659. UET III No. 1305, 1 KA.MAR.KU$_6$: UET V Nos. 32, 10, and No. 24, 6. kamāri

660. Salonen A. Die Fischerei..., 175-176.

661. AfO 18, 329 lines 135 & 139.

662. Helbaek H. in Mallowan Nimrud, 618. Note that a 'lump of sesame' was found at Harappa (late third-early second millennium), Allchin F. 'Early cultivated plants in India and Pakistan' The Domestication and Exploitation of Plants and animals (P.J. Ucko & G.W.Dimbleby eds.), 324.

663. CAD Vol. 4, E ellu B, 106.

664. Pinches Amherst No. 50 i 6-8.

665. e.g. ARMT XII Nos. 480, 6 & 8; 495, 7 & 9; 507 7 & 9; ARMT IX No. 145 7 & 9.

666. Dalley et al. No. 23, 11-18; 11: Ì.GIŠ ma-at-qu sweetened vegetable oil, 11-14: ŠE.Ì.GIŠ ma-at-qu-tum sweetened linseed or sesame oil.

667. Iraq XIV, 43, line 117 cuttings (?) or (šu') ŠE.GIŠ.Ì.MEŠ, line 138: Ì+GIŠ.

668. Pinches Amherst No. 50 i 6-8; UET V No. 595, 1.

669. e.g. Pinches Amherst Nos. 70, 71, 72, 74, 105, 111 etc. SET Nos. 203, 204, 213, 214 etc.

670. Helbaek H. 'Notes on the evolution and history of Linum' Kuml 1959, 103-110.

671. Sources include: Imperial Gazetteer of India, Vol. III 36-37; Bunting B. 'Linseed' Paint Manufacture Vol.21 447 ff.; Adams R.M. Land behind Baghdad, 16.

672. Encyclopaedia Britannica Vol. X, 485, Flax.

673. Sources include: Imperial Gazetteer of India Vol.III 37-38; Adams Diyala 16; Oil seeds in India, Appendix V, 79

674. Kraus F. 'Sesam im alten Mesopotammien' J.O.A.S. 88, 1968, 112-119.

675. ibid., 118 (Section F) suggests that the references to the seeds 'falling out' relate to a loss of seed due to carelessness on the part of the people harvesting the plants but it could also refer to the falling-out of seeds which is a part of the threshing process.

676. Sources include: Bearn J.G. The Chemistry of Paints, pigments and varnishes, 174; Encyclopaedia Britannica Vol. XVI 'linseed', 734; Tempany Sir H. 'The Tropics as sources of vegetable oils and fats' Chemistry and Industry July 18th 1953, 733; Guest E. The Cultivation and marketing of linseed.

677. suggested by the Research Nutrition Officer of FAO, personal communication, 8th.January 1976.

678. Joshi A.B. Sesamon 19

679. ŠE.GIŠ.Ì BAR.GA = (šamaššammū) ḫal-su-ti AfO 18, 328 line 39.
Ì.GIŠ.BARA.AG.A = ḫal-su Hh.XXIV 16 in CAD Vol. 8 H ḫalsu 50-51.
See also CAD Vol. 4 E ellu; Vol. 8 H ḫalāṣu 1) to press to squeeze out, 40.

680. CAD Vol. 16 Ṣ ṣaḫāṭu, 60-1. CAD has extended the meaning of ṣaḫāṭu 'to press' to cover the process of obtaining oil from sesame seeds by boiling the seeds and skimming off the oil but this is not necessary as cold-pressing can be used on sesame and is the usual way to obtain linseed oil.

681. Pinches Amherst No. 83, 1-5.

682. ibid., No. 50 i 7-8

683. UET V No. 595, 1.

684. Main sources for linseed and sesame oil are: Oilseeds FAO Pamphlet 22; letter from the Research Nutrition Officer, 8th January 1976; Food Industries Manual, 763; Chemistry of paints, pigments and varnishes, 174; Joshi A.B.Sesamon, 21.

685. Communication from Soviet Encyclopaedia, sent in answer to enquiry.

686. Darby et al. Food: the Gift of Osiris II 783-4.

687. e.g. Ì.GIŠ: Umma: (Agade) Lambert RA 59, 123, No. 40, line 20. List includes ingredients for beer, pulses spices, fish etc.
Lagaš: (Ur III): Pinches Amherst Nos. 70, 71 etc. Messengers' rations.
ŠE.GIŠ.Ì and Ì.GIŠ: Mari (Old Babylonian) e.g. ARMT XII No. 480, line 6 & 8; No. 495 7 & 9 etc. In the king's meals.
Nimrud (Neo-Assyrian) Iraq XIV, 43 lines 117 & 138, provisions for Aššurnaṣirpal's feast.

688. Dalley et al. No. 23 lines 11, 13 & 14.

689. e.g. Layard Sir H. Early Adventures in Persia, Susiana and Babylonia I, 67, 103.

690. e.g. MSL XI, 119, lines 24, 28-31.

691. Joshi A.B. Sesamon, 2.

692. CAD Vol. 4 E emēmu, 148 (KAR 199:12) (note DAB 247 has sirdu bitter almond); AHw 1037 serdu

693. FAO No. 22 Oilseeds, 58.

694. Boardman J. 'The Olive in the Mediterranean: its culture & use', Early History of Agriculture, (Sir John Hutchinson), 188.

695. J.Giles Waines in 'Tell Taya...' (J.R. Reade) Iraq XXXV, 1973, 187; Helbaek H. 'Plant economy in Ancient Lachish', Lachish IV (O. Tufnel), 313; Helbaek H. in Mallowan Nimrud, 616.

696. ARMT VII No. 238, 16 & No. 256, 5.

697. Iraq XIV, 44 line 140.

Pages 204-218

698. Pellet P.L. & Shadarevian S. Food Composition: Tables for use in the Middle East, No. 9 Arabic bread, 279 Kcals per 100 grams edible portion; No. 42 dried dates, 318 Kcals; No. 45 dried figs, 305 Kcals.

699. DAB 308, 302, 314, 302.

700. Grapes will not be discussed in this section but in section 8 under Wine.

701. Sources include: Dowson V.H.W. Dates and date cultivation of the 'Iraq; Popenoe P. The Date palm ; Iraq Handbook 457-59.

702. Le Strange G. Lands of the Eastern Caliphate, 90, 98-99

703. Dowson V.H.W. Dates and date cultivation..., 29 (Iraqi Arabic)

704. Popenoe P. The Date Palm, 99.

705. Main sources: Kennard W.C. & Winters H.F. Some fruit & nuts for Tropics 61; 'The Fig in the Spotlight' International fruit world XXI, 1967; Prest P.L. & Ross A.A. 'The Fig' Queensland Agricultural Journal 81, 1955, 137-146; Zohary D & Spiegel-Roy P. 'Beginnings of Fruit Growing in the Old World 'Science Vol. 187, 1975, 324.

706. Iraq Handbook, 469.

707. Main sources: Kennard W.C. & Winters H.F. Some fruits and nuts..., 102; Zohary & Spiegel-Roy 'Beginnings of fruit growing..' Science Vol. 187, 324; Evreinoff V. 'Le Grenadier' Fruits d'Autre Mer Vol.4, No. 5, 1949, 161-170; Popenoe W. Manual of Tropical & Subtropical fruits, 375-383.

708. Main sources: Brouk B. Plants consumed by man, 152-155; Flora II, 107-110.

709. Brouk B. Plants consumed by man, 152.

710. Philby H.St.J. Heart of Arabia I, 343.

711. Main sources: Flora I, 156-57; 'The Apricot' International Fruit World, Vol. 18, 3-17, 187-198.

712. Zohary D & Spiegel-Roy P. 'Beginnings of fruit growing...' Science, Vol. 187, 323 and Note 31, 326.

713. Ellison R. et al. Journal of Archaeological Science in press.

714. London Illustrated News Sep . 6, 1958, 389, Fig. 17

715. UVB X, 14-15, near the pillared hall.

716. Starr Nuzi I, 493.

717. Helbaek H. 'Plant remains at Nimrud', 616, in Mallowan Nimrud.

718. Starr Nuzi I, 493.

719. Helbaek H. in Mallowan Nimrud, 616.

720. Ellison R et al. Journal of Archaeological Science, in press

721. e.g. Deimel A. Or.16 46-48; Bauer Nos. 91 & 92; de Genouillac H. Tablettes Sumeriennes Archaiques Nos. 42 & 43.

722. MAD 5, No. 106.

723. BE III/1, Plate 27, No. 75 (see also, 63 No. XV)

724. On the basis of 1 SÌLA = 1 litre this equals about 50 kg per tree which compares very well with the average yield in Iraq given by Dowson, see above. (Conversion to Kg based on a litre of dates weighing .6 Kg - this is only a rough measure because of the difficulty in weighing litres of dates.)

725. CAD G gaṣāṣu (kaṣāṣ), 53, to trim, mutilate.

726. Driver and Miles The Babylonian Laws, 32-35.
CH 59-66.

727. SLB I/3 Nos. 71 7-11; 72, 1-10 (Lagaba)

728. Parrot Sumer No. 346

729. Van der Waerden B.L. 'On Babylonian Astronomy I...' Ex Oriente Lux II, 1952, 421-422.

730. Moortgat Art No. 241

731. e.g. Gadd Stones Plates 9 & 11, 13 & 14, 26.

732. Moortgat Art No. 257, but note that Bonavia E. Flora..., 72-75, disagrees with this, considering that the trees are being sprinkled with holy water from pine cones.

733. Moortgat Art Nos. 283, 287.

734. Gadd Stones Plate 41 & 42.

735. Layard II Plate 14.

736. Gadd Stones, Plate 16, 18b, 20, 27, 36.

737. Bonavia E. Flora..., 12.

738. Layard II Plate 14.

739. ibid., Plate 22 and Barnett R. Assyrian Palace Reliefs in the British Museum. (pamphlet) Plates IV & V.

740. Loud G. Khorsabad I, 93-98, Fig. 104.

741. e.g. An.Or.2, 8 No. 1 (DP 124), 9 No. 3 (Amherst 2)

742. e.g. An.Or.2, 15 No. 2 (RTC 61), 17 No. 4 (DP 134)

743. e.g. Ur: UET III No. 1033, line 17 (Mentioned in total only.); No. 1047 r i 13-17, rii 5; No. 1048, 27-29, 36; No. 1090 1 & 2; No. 1092 102; No. 1095 1-3; No. 1098 1-2.

744. DAB 302.

745. TCS I No. 162, 3.

746. UET III No. 96 2, 6-7.

747. Eames Coll. D.27 Note that Landsberger disagrees with the translation of GIŠ.IAR as 'cake' preferring to take it as a type of basket, Landsberger Date Palm, 37 para.2.

748. SET No. 198

749. UE II Plate 141 a.

750. Lambert M & Figulla H.H. 'Les archives de Urabba, fils de Bazi' RA 58, 1964, 102 No. 63 1-4.

751. DAB 304

752. Philby H. St.J Heart of Arabia I, 343.

753. MSL V, 96, line 33; CAD Vol. 8, K kamiššaru, 122.

754. DAB 305; AHw 1149 šallūru

755. DAB 305; CAD Vol. 6, H ḫabḫu (B), 29.

756. Flora II, 155-156.

757. e.g. Ur: UET V No. 505, 2 & 508, 1 & 12; SLB I/3 Nos. 82, 90 (Lagaba)

758. Figulla (Iraq) e.g. Nos. 24, 3; 25, 3; 26, 3; etc.

759. SLB I/3 No. 115, 1. (Lagaba)

760. e.g. ARMT XII No. 414, 6; IX No. 213 i 10, ii 9 passim; IX No. 214 ii 11, 24, iii 34 passim.

761. ARMT XI No. 13 1-3

762. ARMT XII No. 440 1-4; IX No. 115 1-3.

763. ARMT XI No. 93, 1-3. XII No. 739, 1-3.

764. ARMT XII No. 440, 2; XI No. 240 1-4.

765. ARMT IX No. 282 1-3.

766. ARMT XII No. 201, 1.

767. MSL V, 95 line 30a; ARMT XII, 8 note 5.

768. Dalley et al. No. 33, 6, 8-9. arwānu is taken as a variation for GIŠ.ḪAŠḪUR.KUR.RA/armannu; CAD Vol. I/2 armannu 291

769. ARMT IV No. 42, 15-20.

770. ARMT XI No. 240, 1-4.

771. UET V No. 593, 5.

772. Starr Nuzi I: Lacheman E.R. 'Epigraphic evidence of material culture', 535; HSS XIV No. 215, 9, 11, 13-16.

773. Postgate Archives No. 139 (ND 419) 8-11; Van Driel, 88, BM 121206 vi 15', 16'; 100, x 24', 26'

774. Postgate Taxation, 336 (ADD 1695), 9.

775. Iraq XIV, 43 lines 122, 135.

776. DAB 321.

777. Layard II Plate 9a.

778. CAD Vol. ? B bututtu (A); 359; DAB 252-254.
Many varieties of pistachio grow in the Near East and it is difficult to assign bututtu to a particular variety. CAD takes bututtu to be the Pistacia Vera tree and nut, but DAB prefers GIŠ.LAMGAL/bututtu to be the P. terebinthus. The identification is complicated by the similarity between bututtu and the Hebrew botnim, Arab. butm, and Syr. betm^{e}tha and butma, all of which have been translated as different types of pistachio trees, e.g. butm is used is used in Iraq to describe the nuts of the P. Khinjuk and botnim has been translated as the P. terebinthus. In view of these problems, it is probably best to take GIŠ.LAMGAL/bututtu as a pistachio-type nut without assigning it to any particular type of pistachio-tree. Many varieties of the pistachio grew in Iraq at one time or another (see Flora I, 83-87) especially in the foothills and mountain regions, for instance P.Khunjuk has been found on the southern slopes of the Jebel Sinjar and P. Atlantica in the Kurdish hills.

779. Musil A. Manners and customs of the Rwala Bedouins, 95.

780. ARMT XI No. 13, 2-3.

781. ARMT IV No. 42, 18-20.

782. Iraq XIV, 43, lines 124, 135.

783. Figulla (Iraq), 97 and e.g. No. 18 & 19; Figulla has taken it to mean the edible nut of the pine-tree.

784. Dalley et al. No. 204, 9.

785. Van Driel, 88 BM 121206 vi 14'.

786. Starr Nuzi I, 494.

787. Helbaek H. in Mallowan Nimrud II, 616.

788. Mallowan Nimrud I, 270, II 377-78.

789. ibid., 153.

790. Helbaek H. 'Plant economy in Ancient Lachish' in Lachish IV (O.Tufnell), 311.

Pages 218-227

791. Loewenfeld C & Back P. The Complete book of Herbs & Spices, 22

792. Davidson Passmore & Brock, 209.

793. For a list of spices in the cuneiform texts see RlA 'Gewürze', 340-344.

794. CAD Vol. 8 K kisibirru 420-421.

795. DAB 66

796. Loewenfeld C. & Back P. The Complete book..., 108.

797. Bauer No. 4, iv 1, vi 3, vii 2 & 7.

798. Lambert RA 59, No. 40, 17-18.

799. SET No. 188, line 25.

800. Pinches Amherst No. 69, i3 & 19, iii 2, 3, 21, iv 10.

801. e.g. Figulla (Iraq), 98, No. 18 lines 11 & 30.

802. Dalley et al. No. 120 & No. 140.

803. HSS XIV No. 539, 2 passim; No. 601, 7-12, 16. Note that in the latter the spices are ri-i-qu ša a-si-i ša URU zi-iz-me (lines 8-10) 'spices for growing' ?asu to grow, Sprout. CAD I/2 A, 365 (2).

804. Meissner B. ZA 6, 1891, 201, col.ii.

805. Iraq XIV, 44 lines 139.

806. ARMT IX No. 238, 6, 12, 17 - MU, abarakkatum & mersu; ARMT XII No. 733, 5-7 - abarakkatim; XII No. 729, 3. king's meal.

807. ARMT XI No. 140 1-5.

808. Helbaek H. 'Late Cypriot Vegetable Diet' from Apliki' Opuscula Atheniensia IV, 1963, 183. (Note however that he does not mention this in Mallowan Nimrud.)

809. CAD Vol. 8 K kamūnu 131-132, A. Ú.DIN.TIR appears to be read GAMUN in the Sumerian period (See Hoffner H. Alimenta Hethaeorum, 103 and note 70). Cumin is also written GÚ.MUN and GA.MUN in Bauer No. 70 ii 4 and MAD 3, 147. Care should be taken when considering this spice as many languages use 'cumin' when referring to 'caraway seeds' (name derived from Arabic karauya). For instance the German Kummel can mean caraway or cumin and in Swedish kummin is used for caraway seeds. This is partly because caraway seeds have recently almost completely taken over from cumin in Europe, and is an example of the transfer of a name from one type of plant to another because they fulfill the same purposes. (For discussion see Brouk B. Plants consumed by Man, 287-288 & 298)

810. Bauer No. 70 iii 4. Bauer translates GÚ.MUN as kamūnu but it is possible that this is in fact another type of pea or bean.

811. UET III No. 900, 3 (Ú.TIR) see also Pinches Amherst No. 69, for Ú.TIR e.g. i 2.

812. Dalley et al. Nos. 129, 17; 140, 14-18.

813. ARMT XII No. 733, 3; No. 734, 3; IX No. 238, 4, 11, 16.

814. HSS XIV No. 539, 4; No. 601,3 passim.

815. Iraq XIV, 43, line 135.

816. CAD Vol.21, Z zibû (A) 104-105.

817. DAB 71 & 72. I myself have bought hab essoda in the bazaar at Baghdad. The seeds are nothing like those of cumin and are small and black.

818. ARMT IX No. 238, 2, 10, 15; XII No. 729, 4; No. 733, 2; No. 734, 4.

819. ARMT XII No. 734, 8 with a query.

820. AfO 18, 337-338. Note that CAD Vol. 8, K kasû 248-250, simply says '(A native spice, specifically its pungent seeds)', and that its botanical identification is not established.

821. Brouk B. Plants consumed by man, 290 & 293-294.

822. Loewenfeld C & Back P. The complete book... 186-188.

823. Lambert RA 59, No. 40, 19.

824. Pinches Amherst No. 69 i 4, iii 6 & 22, iv 12.

825. SET No. 188, i 15, ii 46, iv 2 passim.

826. Figulla (Iraq) No. 18 lines 8 & 29.

827. ARMT XII No. 734, 8.

828. HSS XIV No. 601, 1 passim.

829. CAD Vol. 8 K kasû 248-250; ibid. 248 Hg B VI 102 UTUL A GAZI.SAR = um-mar me-e ka-si-i soup made with kasi-juice; MSL 8/2, 120: Hh.XVIII 127 (fish preserved in GAZI.SAR)

830. CAD Vol. 8 K kasû, 249,(BE 8/74:1)

831. ITT 3, 5926 line 1: 3 GUR 1 PI 5 BÁN 7½ SÌLA GAZI, listed with small amounts of cress seed and cumin (lines 2 & 3).
Boson Tavolette 364, line 2: 1 ikû GIŠ.SAR yields 2 BÁN GAZI.;
YOS 2 152, 25. (see CAD Vol. 8, K kasû, section 2, 248): GAZI is associated with chick peas, lentils, garlic etc.

832. DAB 192-194, which suggests that kasia in Neo-Babylonian times was the husks of Ceratonia siliqua Carob pods (but cf CAD Vol. 6, H ḫarūbu, 120-121)

833. DAB 67-69.

834. e.g. Pinches Amherst No. 69 i 2, iii 11, iv 13; HSS XIV No. 539, 5; AfO 18, 329, line 61; Meissner B. ZA 6, 1891, 291 col. i.

835. ARMT IX No. 238, 3.

836. DAB 157-161.

837. CAD Vol. I/2 A azupīru 530-531.

838. Colin J. Herbs & Spices 146-47.

839. ARMT XIX No. 238, 5; XI No. 275, 4.

840. HSS XIV No. 539, 3.

841. Meissner B. ZA6 1891, col ii and 204.

842. DAB 64-66.

843. Dalley et al. No. 38, 9.

844. Helbaek H. in Lachish IV (O. Tufnell), 311.

845. DAB 61-64; AHw 1238.

846. HSS XIV No. 539, 1.

847. DAB 74; note that CAD Vol. 6, H ḫašû B, 144-145, is not so definite in its identification.

848. Davidson Passmore & Brock, 84-85.

849. Rank Hovis & McDougal Foods Ltd., Research Centre - personal communication 9th December 1976.

850. Edzard D.O. Sumerische Rechtsurkunden, 28, note to 4 v 5.

851. Iraq Handbook, 475.

852. Bauer No. 133 i 5; No. 144 i 4; No. 147 i, 2; No. 149 iii, 2; (Early Dynastic)
CT 50, 143, 1. (Arade)

853. Westenholz A, personal communication 3rd January 1977. Text to be published in OSP II.

854. SET No. 181, 17.

855. Pinches Amherst No. 69 i 11, iii 16, iv 6;

856. Figulla (Iraq) No. 67 ii 3, iii 6 etc.

857. SLB I/2, 81-85 No. 55 but note Note 1 (p.83) where Leemans refers to Torczyner Tempelrechnungen No. 63 for Kassite references to salt. BE XV No. 169 quoted by Torczyner as one of the texts listing salt. However the sign given by him as MUN/tabtu should read MUNU$_x$/buqlu, malt. This text also lists BAPPIR (not ŠEM as given by Torczyner.)

858. AASOR 31 LE No. 1.

859. Postgate Taxation, 399 (ND 3467), 9.

860. Iraq XIV, 43, lines 132 & 120; CAD unpublished volume M consulted in Chicago in draft. madlu salted.

861. Van Driel, 128, A125 col.v, line 12'. MUN ina UGU tak-me-sa-a-ni salt on the pickled mutton. (cf. JNES IV, 160-161, line 96 & note 78)

862. DAB 31-36, see also Eames Coll. No. A3; AASOR 31, No. 1, 25 Meissner B, ZA 6, 1891, 293.

863. RlA, 342 (under Gewürze)

864. e.g. Eames Coll. A3, B4, D13, G12; SET No. 215, No. 216.

865. AASOR 31, LE No. 1, 25.

866. Locwenfeld C. & Back P. The complete book... 86-88.

867. Personal communication (11th October 1976) from Professor H. Limet; personal communication from Rank Hovis, McDougal Foods ltd., 9th December 1976.

868. CAD Vol. 8, K. kuddimmu, 493.

869. Luckenbill D.D. Ancient Records of Assyria and Babylonia, 39 para 114.

870. Iraq XIV 43, line 120.

871. Postgate Taxation No. 339, 9 (ND3467)

872. CAD Vol. 3 D dišpu 161-163.

873. Weissbach F.H. Babylonische Mescellen WVDOG 4, 11 col.iv 13-16 & v 1-6.

874. Personal communication from Professor Limet (11th October 1976) He cites TCL 5, 5680 rev. ii (Plate XVIII); 6162, i 23 (Plate XLIX) (the quoted example) and YOS 4, 295.

875. ARMT VII No. 238, 15 & 21; No. 257, 2, 6 & 10.

876. MSL XI, 78, line 7.

877. CAD Vol. 3, D dišpu 161, lexical section, see Lugale XII 30 and 163, No. 5'.

878. CAD Vol. 3 D *dišpu*, 161 a); TCL 17 Plate XLII No. 53, lines 19-21.

879. ARMT XI No. 259, 1, 7, 12; No. 260, 1, 5, 8, 13; XII No. 502, 9; No. 504, 7; No. 505, 8 etc.

880. Dalley et al. No. 204, 2.

881. Figulla (Iraq), 98 No. 18 lines 14 & 24.

882. *AfO* 18, 329, line 115.

883. ibid., 329, line 116 and CAD Vol. 3, D *dišpu*, 163.

884. Mallowan Nimrud, 152.

885. As for instance in the making of *mersu* - see MSL XI, 119, line 32.

Pages 227-234

886. Sources include: Sichel A. The Penguin book of Wines; Chambers Encyclopaedia Vol. VI, 479-480 'grape'; Iraq Handbook 462-463; Results of the Agricultural & Livestock Census in Iraq...

887. The numbers of vines tend to be few however. In each of the Amara Qadha and the Nasiriya Qadha only between 2000 and 3000 were grown in 1958/1959. (Results of the Agricultural... Tables 11a.)

888. Forbes R. Studies in Ancient Technology Vol. 3, 74-76 and Fig. 17.

889. ibid., 110, Figs 25 & 26.

890. ibid., Figs 19 & 20.

891. CAD Vol. 8, K karānu 202-209.

892. de Genouillac H. Tablettes Sumerienne Archaique, 96-97, Nos. 42 & 43, Plate XXXVII, iii 4 & 7 passim; Bauer No. 92 iii 4 passim; Deimel A. Or. 16, 48 No. 8 (DP 107), 46, No. 2 (Nik.146)

893. Bauer No. 155 i 5, ii 1 passim.

894. ibid.,411.

895. Pinches Amherst No. 54 line 3.

896. ibid., rev. line 7.

897. Copy by Dr. I.M. Price, Great Cylinder Inscriptions A & B of Gudea, Cyl. A. col. xxviii especially lines 10 & 11 and 23-24; transliterated by Thureau-Dangin F. Les Inscriptions de Sumer et d'Akkad, 172; see also Lutz H.F. Viticulture and Brewery in the Ancient Orient, 37.

898. e.g. Cylinder Seals Plate XV a, 5 & m; Parrot Sumer No. 178; Moortgat Art No. 42, No. 47.

899. ARMT VII No. 238, 14 & 20; No. 256, 1-4.

900. ARMT XIII No. 74.

901. ARMT IX No. 15, 272 para.42.

902. ibid., No. 13.

903. ibid., Nos. 186 & 187.

904. ARMT IX No. 14, 1; No. 15, 3 & No. 17, 10.

905. ARMT IX No. 17,7 & 9.

906. ARMT IX No. 15, 1-5; No. 17, 9-11.

907. ARMT IX No. 186.

908. ARMT IX No. 186, 1.

909. ARMT VII No. 199, 18-30.

910. Lutz H.F. 'Babylonian letters in the Yale Collection from Larsa' in Letters of the First Babylonian Dynasty (ed. G.R Driver), No. 99.

911. BE XIV No. 56. Note that this should be read GEŠTIN.GAL and not DUG.GAL as transliterated by Clay, 30 No. 12.

912. e.g. Porada I, No. 315 e, No. 316 Plate XLVIII; Cylinder Seals Plate XXVII b, g.

913. Starr Nuzi II Plate 62 S & T (late GA.SUR); Plate 76, M, N,), P.

914. ibid., Plate 77 A-S, Plate 78, especially Q.

915. AfO 18, 330, lines 182-188.

916. ibid., 340, lines 9', 13'.

917. Iraq XIV, 42, line 116; 43, line 123.

918. Wilson, J.V.K., Nimrud Wine Lists; Wiseman D.J. 'Nimrud Tablets 1952' Iraq XV, 1953, 148 ND 3486.

919. Postgate Taxation No. 399,7(ND 3467) but note that only 1 SÌLA GEŠTIN.MEŠ is listed.; ibid., No. 369, 2 (ND 453) - counted as DUG.SAB bowls; Thureau-Dangin F. The relation de la Huitième Campagne de Sargon, 10 col.i line 53.

920. Parpola S. Letters from Assyrian scholars No. 51, rev.3

921. Postgate Taxation, 266 ABL 241, 5-6 - nāmurtu for the month of Kanūnu.

922. Parpola S. Letters from Assyrian Scholars, No. 30, 10 and 218.

923. Van Driel. 88 BM 121206 vi 15'

924. Gadd Stones Plate 16.

925. ibid., Plate 18 b.

926. Parrot A. Nineveh & Babylon No. 49.

927. Layard II Plate 14.

928. Parrot A. Nineveh & Babylon, No. 60

929. Mallowan M.E.L. and Davies L. Ivories Assyrian Style, Nos. 74, 77 & 78. Plates XXIII & XXIV; Barnett R. and Faulkner M. Sculptures of Aššurnaṣirpal..., Plates XX, XLVI, CXIV.

930. Gadd Stones Plate 14.

931. ibid., Plate 29; it is possible that some of the 'skins' represent sacks containing food rations and other belongings, see Gadd Stones Plate 35, where some prisoners have 2 'skins' one larger than the other.

932. Parrot A. Nineveh & Babylon Nos. 41 & 183; Mallowan M.E.L. & Davies L. Ivories Assyrian Style Plate V No. 7; Porada I No. 673 c Plate XCIX and No. 776 Plate CXVIII.

933. Parrot A. Nineveh & Babylon No. 60.

934. Botta P.E. Monument de Ninive Plate 112.

935. Oates J. 'Late Assyrian pottery from Fort Shalmaneser' Iraq XXI, 1959, Plate XXXV No. 7, Plate XXXVI Nos. 27 & 28; Lines J. 'Late Assyrian pottery from Nimrud' Iraq XVI, 1964, Plate XXXVIII Nos. 7 & 8. Only those quoted were calculated for capacity measures - calculations were made from the drawings.

936. Oates J. Iraq XXI, 1959, Plate XXXVI Nos. 37-48, Plate XXXVII Nos. 50-54, 60-62, 64, 78-80. (see also Chapter 4 and note 302 where the capacities were found by filling the vessels with water.)

937. Waines D.G. in 'Tell Taya....' (J.R. Reade), Iraq XXXV, 1973, 187.

938. Helbaek H. in Mallowan Nimrud, II, List A & p.616.

939. Thureau-Dangin F. Une relation de la huitième compagne de Sargon, 32, col.ii, line 205.

940. Layard II Plate 9b.

941. e.g. BBST, 129, No. 37, lines 10-11; CAD Vol. 8 K Karanu 203-204.

942. Levey M. Chemistry and Chemical Technology in Ancient Mesopotamia, 31-36.

943. Information supplied by Professor E.E.D.M. Oates.

944. Levey M. Chemistry and Chemical Technology... 36-38.

References and Notes for Chapter 4. Pages 235-314

1. The unit of energy is the joule (J) which represents the energy used when 1 kilogram (kg) is moved 1 metre (m) by a force of 1 newton (N). Nutritionists now express amounts of energy in terms of kilojoule ($kJ = 10^3 J$) and megajoule ($MJ = 10^6 J$) but formerly energy was expressed in units of heat - the kilocalorie (Kcal). This represents the amount of heat required to raise the temperature of a litre of water from 15° to 16°C. Because the term 'Calorie' has become part of the common language and has an instant association with diet it has been decided to use it throughout this study when discussing the energy value of food etc. A quick conversion from Calorie to joules can be made by multiplying by 4.2 (more precisely 4.186) (Davidson, Passmore & Brock, 8).

2. FAO Nutritional Studies No. 15 'Calory Requirements', 11.

3. Clark C. & Haswell M. Economies of Subsistence Agriculture, 12 & 3. For instance calculations based on data from central Africa suggest that 2820 Calories would be required for a four hour day and 3402 for an eight hour day. The activities here include field work, house-building, walking to work etc., and the weight range is between 43-63 kgs. The FAO adjustment to African conditions gives a requirement of 2707 Calories/day.

4. United States Department of Agriculture, Foreign Agricultural Service - M-108 Feb. 1961. 'Food Balances in Foreign Countries' No. 4, Table 4.

5. Davidson Passmore & Brock, 34.

6. ibid., 38; This does not mean however that cereal grains are not essential in the diet; they contain proteins and when used whole have a reasonable supply of the B vitamins. This latter may be lost in milling. In addition it is believed that the part of cereal grains (whether whole or as bread) which can not be absorbed by the gut plays an important role in the health of the bowels and intestines and it may be due to this that these is comparatively little incidence of bowel cancer in Arab populations. (Burkitt D.P. Cancer 1971, 28, 2.)

7. Main source: Davidson, Passmore & Brock, chapter 6, 62-77.

8. ibid., 76-77.

9. ibid., 65, 72 & 323 ff.

10. FAO Nutritional Studies No. 28, 'Handbook on Human Nutrition', 15.

11. Davidson, Passmore & Brock, 58.

12. Miller D. 'Evaluation of diets in relation to nutritional status' Proceedings of the Nutrition Society, 1970, 29, 191

13. Davidson, Passmore & Brock, 59.

14. FAO Nutritional Studies No. 28, 19

15. Davidson, Passmore & Brock, Chapter 5, 45-61; FAO Nutritional Studies No. 28, chapter 3, 15-22.

16. Davidson, Passmore & Brock, 120-125.

17. ibid., 125-128.

18. ibid., 132-137.

19. FAO Nutritional Studies No. 28 Table I: intakes for for Vitamin C, thiamin, niacin, riboflavin and iron.

20. Davidson, Passmore & Brock, 137-140.

21. ibid., 141-143.

22. ibid., 143-145.

23. ibid., 146-148.

24. ibid., 148-150.

25. ibid., 92-102.

26. ibid., 105-108.

27. ibid., 84-90.

28. ibid., 539.

29. ibid., 85-90.

30. ibid., 88-89.

31. ibid., 111-112.

32. Patwardhan V.N. & Darby W.J. Nutrition in the Arab Middle East, 277-278. Note that the study of Caughey and Follis in the Mosul area recorded an even higher incidence of goitre among school children.

33. Davidson, Passmore & Brock, 177.

34. Bauer Nos. 152-156.

35. Bauer No. 153.

36. UET III No. 122

37. These texts are mainly published in transliteration and translation in ARMT Vols. VII, IX, XI, & XII.

38. e.g. ARMT IX Nos. 163 & 168, ii 9-15.

39. ARMT IX No 68, No. 71 rev.iii 15-24.

40. e.g. 7th Kiskissum, Year Zimri-Lim counted the land;

recorded in daily records in ARMT XI No. 168, and IX No. 95. Details given in No. 95 are included in the monthly record of ARMT IX No. 98, ii 1-10. See also 4th Uruḫam, same year, in monthly record ARMT IX No. 109, i 24-35. Different amounts are issued on 3rd Uruḫam in ARMT XI No. 175 and 4th Uruḫum in ARMT XI No. 176.

41. This would suggest that the scribe of ARMT IX No. 71 had in fact made a mistake in putting both meals down for 17th Malkanum.

42. ARMT IX No. 251, line 7.

43. ARMT XII No. 685, lines 3 & 6, No.686, lines 6 & 10.

44. Waterman, L. Royal Correspondence of the Assyrian Empire, I No. 5 obv. 14-16, rev. 15-18.

45. R.Acc., 74.

46. ibid., 61-85 'Le Ritual du temple d'Anu a Uruk'

47. Philby H.St.J. Heart of Arabia I, 88-89

48. Musil A. Manners and Customs of the Rwala Bedouin, 86-87

49. UE II Plate 193 No. 17 U.10871.

50. ibid., Plate 193 No. 18 U.10872.

51. Cylinder Seals Plate XVc. See also Plate XV f, here one figure drinks from tubes and in the lower register servants are carrying a large vessel suspended from a pole. The 'food' on top of the sideboard is very schematically drawn.

52. Parrot Sumer No. 177

53. ibid., No. 161 A

54. Moortgat Art, No. 47.

55. ibid., No. 49.

56. e.g. Boehmer Plate XXXII No. 387, Plate LIX No. 646; Cylinder Seals Plate XXIV f.

57. Philby H.St.J. Heart of Arabia, I, 88-89, II 98. Note that in Philby's time rice was common but bread or burghul was sometimes used instead.

58. Porada I Plate XXXIX No. 252.

59. Delaporte Catalogue Louvre II Plate 72, No. 6.

60. McCown D.E. & Haines R.C. Nippur I, Temple of Enlil... Plate 10, No. 12, level TB IV (Ur III); Plate 112 No. 6, level TAXII$_2$ (Isin/Larsa)

61. Delaporte Catalogue Louvre I Plate 50, No. 13; Amiet P. Glyptique Susienne Plate 170 Nos. 1910, 1916, Plate 171, Nos. 1920 & 1935, Plate 180 No. 2067.

62. Parrot Sumer No. 348 a & b (for discussion of the date see Moortgat Art, 72-74.

63. Du Ry C.J. Art of the Ancient Near and Middle East, 123.

64. Moortgat Art No. 288.

65. e.g. Porada I Plate XCIX Nos.673 & 674, Plate CIV No. 700; Buchanan B. Catalogue of Ancient Near Eastern Seals I, Nos. 592 & 593.

66. Barnett R.D. & Faulkner M. Sculptures of Aššurnaṣirpal..., Plate LX.

67. ANEP Nos. 633 and 630 respectively.

68. Mallowan Nimrud, 502-504. Figs 403 (holding a plant), 404, 405 (with a lotus? fruit).

69. Rawlinson G. Five Great Monarchies, II, 214.

70. Mallowan M.E.L. & Davies L.G. Ivories in Assyrian Style, Plate V, No. 7.

71. Rawlinson G. Five Great Monarchies II, 215.

72. Moortgat Art, No. 277; Layard II Plate 8 & 9; British Museum, Assyrian Sculptures in the British Museum... Plate LXVIII & LXIX; Gadd Stones Plate 46b.

73. Moortgat Art, Nos. 287 & 288

74. Gadd Stones Plate 39, and p. 179-180 (para.35)

75. Barnett R.D. Sculptures from the Northern Palace..., Plate LXVI Slab A.

76. Gadd Nos.44 & 29b.

77. ibid., Nos. 36 & 35; it is also possible that the sack on the prisoners' shoulders may contain what personal belongings they were allowed to take with them.

78. I am ignoring the subject of whether the priests ate the consecrated food actually set out before the images of the gods.

79. Oppenheim A. Ancient Mesopotamia, 190.

80. see Van Driel.

81. ibid., 94, BM 121206 col. viii, 18'

82. ibid., 202, 12'-14'

83. Postgate Royal Grants No. 54, 107; see discussion on p. 113 and col. vii, 15, col.vii-viii, lines 24 - end.

84. BBSt., 124-5, col. v, lines 8-38.

85. Bauer No. 67, i 1, 3, 5, ii 2, 3.

86. Bauer No. 68 x 2.

87. ibid., No. 156, i 2, 6 and passim.

88. UTU: u.tu U+GA = di-ik-tu, a dairy product, CAD Vol. 3 D, diktum 138.

89. Bauer Nos. 152-156.

90. ibid., No. 153 (and p.133) EZEM.ŠE.KU (This is a month name at Lagaš, see Landsberger Kult.Kalender, 45-61.)

91. This is not to be connected with mundu - semoulina. Bauer No. 153 i 8 and p.411.

92. 4 SÌLA write 2 KÚR. 1 KÚR = 2 SÌLA. (Bauer, 411)

93. e.g. Cylinder Seals, Plate XV c; Parrot Sumer No.197.

94. e.g. Philby H.St.J. Heart of Arabia, I, 88-89, II 98. Musil A. Palmyrena, 17.

95. Platt B.S. 'Some traditional alcoholic beverages and their importance in indigenous African communities' Proceedings of the Nutrition Society, XIV, 1955, 115-123. Platt B.S. and Webb R.A. 'Fermentation and human nutrition' Proceedings of the Nutrition Society IV, 1946, 132-140; Fox F.W. 'Notes on the methods of preparation, composition, and nutritional value of certain Kaffir Beers' Journal of South African Chemical Institute, 21, 1938, 39. These beers are made from a variety of cereals of which maize is one of the most important, but malting and fermentation also increase the B.Vitamin content of wheat and barley beers.

96. See Chapter 3 pages

97. Pellett P.L. & Shadarevian S. Food Composition, Tables for use in the Middle East. Section 1, 43.

98. e.g. Bauer No. 67, i 5.

99. ibid., No. 68 x 2.

100. Davidson, Passmore & Brock, 280.

101. e.g. Bauer Nos. 131-149 for examples of texts dealing with fish.

102. Platt B.S. Tables of representative values of foods commonly used in tropical countries, No. 179, Note. 1.; 170 I.U. = 51 microg. Retinol equivalent (based on I International Unit = .3 microgram RE). The dried fish tested was a fresh-water specimen with edible bones.

103. Ellison R et. al. Journal of Archaeological Science in press.

104. U.E. II See grave contents lists 412-509 and descriptions of grains in main text.

105. Thureau-Dangin F. Les inscriptions de Sumer et d'Akkad, 128 Statue G, col. iii lines 5 - col.iv line 13.

106. UET III No. 149, 1.

107. ibid., No. 377, 1-4.

108. ibid., No. 193, 8.

109. SET No. 181

110. UET III No. 102 (GÚ.SAR line 16)

111. Pellett P.L. & Shadaravian S. Food Composition... , Section 1, Nos. 138 & 141.

112. This suggestion that each individual received a reasonable portion is made on the grounds that as the provisions were made for the king's household, sufficient quantities would be given to provide for all. The meat and 'pulse' being the largest items would presumably form the main part of each portion while the ghee, cheese, fish etc., would be available only in small quantities for each person. The number of people partaking in the meal is unknown nor whether more than one meal is involved.

113. Figulla (Iraq), 88-192.

114. ibid., No. 21, line 17.

115. as in ARMT IX No. 160, when 15th Kiskissum is followed by 17th.

116. ARMT IX 275-276.

117. ARMT XI, No. 183, 6 & 7; XII No. 605 3 & 4; XI No. 250, 11-13.

118. ARMT XI No. 152, 14 & 15.

119. ARMT IX, 276, para.49.

120. ARMT IX, 276, note 1.

121. ARMT XII No. 447 (Mari GUR = 120 SÌLA see ARMT VII, 394, para.5)

122. A complication arises in the totalling with the use of the word šipku. This is sometimes given as the name of a specific item issued for a particular meal, and it is often kept separate in the totals, from the main NINDA totals. On occasions it is used to include such dishes as isqūqu, sasqû and pappāsu. The word šipku seems to come from šapāku, to store, so that its use in the naptan šarrim records may simply mean foodstuffs brought from a particular store. (See also SLB I/2 No. 36, Larsa)

123. naptan šarrim texts for the month of Kiskissum: ARMT IX, Nos 95, 96 & 98; ARMT XII Nos. 167-169; XII No. 388 - 394.

Other naptan šarrim texts for the rest of the Year Zimri-Lim counted the people: ARMT VII No. 134; ARMT IX Nos. 85, 87, 89, 90, 92-94, 99-101, 103-105, 109-111, 113-119, 121, 123; ARMT XI Nos. 152-153, 162-163, 166,-167, 170-171, 176, 178-183; ARMT XII Nos. 363-364, 367-369, 371-374, 377-378, 380, 383, 386, 396, 404-405, 408, 410, 412, 433, 424-425, 429, 431-432, 436-438, 441, 443-447.

naptan šarrim texts for the Year Zimri-Lim built Dur Yahdun-Lim: ARMT VII Nos. 141-142, 146, 151-154, 158, 170; ARMT IX Nos. 131, 133, 136, 139-140, 142-143, 145-148, 151, 154-163, 165, 167-168, 170-174, 179, 181, 183; ARMT XI: Nos. 185, 197-198, 200-205, 209-210, 213-215, 217, 220, 222-231, 233-234, 242-247, 249, 250, 252; ARMT XII Nos. 473, 475-476, 480, 484-485, 488-491, 493-495, 498-499, 501-502, 504-505, 507, 511-512, 514-518, 520-523, 525-528, 530, 532, 534-539, 541-542, 544-546, 548, 550, 557-558, 560, 562-568, 571-572, 583-584, 589, 591-599, 602-605, 609.

124. CAD Vol. I/2 A appānu (a leguminous plant) 179. Apparently found only at Mari. The similarity of the Hebrew appon, chick pea, is commented on by CAD.I/2, 172.

125. Not every month is equally well recorded and some months are only represented by one or two daily records.

126. e.g. ARMT XII No. 493, line 4; ARMT XII No. 602 line 4.

127. e.g. ARMT IX No. 173 line 6 (4 SÌLA); ARMT XII No. 584, 9 (1 SÌLA); ARMT XI No. 222, 9 (1 SÌLA), No. 230, 6 ($\frac{1}{2}$ SÌLA).

128. e.g. ARMT XII No. 729 lines 8; ARMT IX No. 238, line 13.

129. ARMT VII, 256, para.70.

130. ARMT IX No. 251, rev. 5'-8'.

131. see Gadd C.J. Iraq VII, 1940, 22-61; AOAT I, 199-260.

132. AOAT I No. 11, lines 1 & 4.

133. Dalley et al. Nos. 193 & 194.

134. Philby H. St. J. Heart of Arabia I, 124; Lady Anne Blunt Bedouin Tribes on the Euphrates, 158.

135. Pellett P.L. & Shadarevian S. Food composition... Section 1, Nos. 42 & 45. On this basis it might be supposed that dried apricots and other dried fruits also maintain their Vitamin A. value.

136. Greengus S. 'Old Babylonian Marriage Ceremonies and Rites' JCS 20, 166, 55-58.

137. see Van Driel.

138. ibid., 93, BM 121206, col.viii 1' & 2'

139. ibid., 194, I.A127 6'-9'.

140. ibid., 202, line 25' ND 1120.

141. Postgate Royal Grants, 110, No. 54 vii 12 - end (and p.113)

142. Iraq XIV 24-39;

143. Van Driel, 202, line 14' allocation of UZU ú-nu-ut lìb-bi (interior organs) to the cook.

144. ibid., 88, BM 121206, vi 14'-16'.

145. R.Acc. 'Le Ritual du Temple d'Anu a Uruk', 61-89.

146. ibid., lines 35-40 & 48-49, obverse, 63.

147. ibid., lines 25-29 obverse, 62-63, and note 4, 81.

148. A number of studies have been made of these rations lists including Deimel A. 'Sumerische Temperwirtschaft zur seit Urukagina und seinger vorganger' An.Or. 2 (see also Or. 34/35 & 43/44); Schneider Dr. A. Die anfänge der Kultervirtschaft die Sumerische Tempelstadt ; Gelb I.J. 'Ancient Mesopotamian Ration Systems' (also including Sargonic and Ur III material) JNES 24, 1965, 230-243; Maekawa K. 'The Development of the É.MI in Lagaš during the EDIII' Mesopotamia , VIII/IX, 1973/74, 77-144.

149. see Or. 34/35, e.g. 2 (RTC 54) dated 6th year Lugalanda, month 2. The term ŠE.BA - barley rations but note Gelb, JNES 24, 1965, 231, that the term ŠE.BA can be extended to include other types of grain and even commodities such as oil and wool, also distributed regularly as rations. However this extension appears more common in post Early Dynastic III.

150. Deimel A. An.Or.2, 3 (STH I,5). This list includes both named individuals and those listed only as professions.

151. Bauer No. 41, iii 3, 4, vi 5, 6; No. 42 iii 8, 9; No. 42 iv 5, 8, 11, 13.

152. An.Or. 2, 3 (STH 1, 5) 10 (DP 128) 5 (Nik.13).

153. ibid., 12 (VAT 4735) 17 (DP 127)

154. ibid., 17 (DP 134) see also 15 (RTC 61)

155. LAK 490 - ?cheese. See Bauer No. 117, i 2 and 327.

156. An.Or.2, 9 (VAT 4858) 10 (DP 126) 8 (DP 216 & Amherst 2)

157. ibid., 7 (DP 124)

158. ibid., 24 (VAT44114)

159. ibid., 25 (RTC 52)

160. ibid., 30 (DP 122)

161. Bauer No. 66

162. NINDA.DURUN.DURUN. Bauer No. 66, line 3 - Bauer has suggested that this is long lasting bread; NINDA.GA$_5$, ibid., line 4 and 632.

163. Bauer No. 66, NINDA.BAR.SI, line ii 5.

164. see Appendix I;
The litres were converted in Kilograms by taking a litre of threshed barley grains and weighing them. This came to .765 Kgs. This figure can vary according to the size of the grains and how firmly they are packed into the litre container but a litre of barley was weighed on number of occasions and the same result was obtained. The equipment used was an ordinary kitchen measuring jug and scales. Once the conversion from litres to Kg. was established the daily rations were turned into Kgs., and then into numbers of 100 grams - that is 1 litre equals .765 Kg = 7.5 '100 grms'. The Calorie and other nutrient value of the daily barley ration was found by taking the nutritional value of barley as shown in Pellett P.L. & Shadarevian S. Food Composition..., Section I, No. 1. The value of one '100 grams' was multiplied by the number of 100 grams in the daily barley rations.
Example:
100 grms of barley provides 360 Kcals., 50 mg Calcium, 4 mg.Iron
7.5 '100 grams' provides:
2700 Kcal., 375 mg Calcium 30 mg.Iron and so on.
(See Figures 1 - 4)

165. see e.g. Maekawa K. 'The Development....' Mesopotamia VIII/IX, 1973/75, 88-91 and Note 19 , Table STH I 7.

166. FAO Nutritional Studies No. 28, Table I 'Recommended Intakes of Nutrients'

167. see. e.g. Maekawa K. Mesopotamia, VIII/IX, 1973/5, 97, VAT 4612, STH I, 23.

168. ibid., 97 (VAT 4612) and 98.

169. Davidson, Passmore & Brock, 134.

170. ibid., 122.

171. e.g. Or. 34/35:
Lugalpae SIB.SAH: 72 SÌLA: 1) 2/3 RTC 54, Lugalanda 6, 2; 2) 5 STH 1, 6 (Up.1,2); 3) 7 STH 1, 7 (U2,2); 6) 16, STH 1, 8 (U3, 1); 48 SÌLA: 10) 25 DP 121 (U6, 6); 11) 27 STH 1, 13 (U6, 10)

Gala-tur NITÁ: 36 SÌLA, and Nin-bar-da-ri: 24 SÌLA:
1) 43 & 45 VAT 4416 (L6, 1); 2) 48 & 49 VAT 4628 (L6, 9); 3) 52 & 53 STH 1, 15 (Up.1,6) (here Ninbardari gets 36 SÌLA): 8) 66 & 67 DP 113 (U2, 8) (Galatur now gets 72 SÌLA); 9) 71 & 72 STH 1, 17 (U3, 10) (Galatur drops to 60 SÌLA); 10) 76, TSA 14 (U 4, 4); 14) 91 & 92 DP 114 (U5, 3); 17) 98 STH 1, 18 (U6 12) (only Galatur who now has 48 SÌLA); 19) 110 DP 115 (U.6)(Ninbardari only); 20) 113 TSA 17 (U6..) (Galatur now only 36 SÌLA); 20) 114 TSA 17 (U6..) Ninbardari.

Galatur's rations show a number of fluctuations. He starts with 36 SÌLA and at first sight his rise to 72 SÌLA 2 years later suggests he has changed in age and status, that is from adolescence to full adulthood. However his drop to 60 SÌLA the next year, and 48 and then 36 SÌLA 3 years later cannot be because of old age. The drop to 60 SÌLA could have been because of a misdemeanor or demotion in his work. The two drops in Urukagina's final year (taken with Lugalpae's drop in that year) may be because of the political problems of the period or because of poor conditions in Lagas.

172. Maekawa K. Mesopotamia VIII/IX, 1973/75, 88-98. He gives GÌM.DUMU.TUR.TUR.IA.NE as GÌM.DUMU.DI_4.DI_4.LA.NE.

173. This has been worked out on the basis of Y.Rosengarten's reconstruction of the Lagaš calendar Le concept Sumérien de consommation dans la vie économique et religieuse. See also Maekawa K. Mesopotamia VIII/IX, 1973/75, 105 and note 37. It alters the month numbers given by Deimel in Or 34/35.

174. Pellett P.L. & Shadaravien S. Food composition... , Section I, 1, 7 (as exmple) 36, 42, 43 & 100.

175. Davidson, Passmore & Brock, 280 - germinated pulses are used to provide Vitamin C in India.

176. Pellet P.L. & Shadarevian S. Food Composition..., Section I, No. 125, Retinol equivalent 93, Vitamin C 30 mg.

177. Umma: Lambert RA 59, 22 No. 44 & No. 45;
Nippur: Westenholz Jena Nos. 28, 39 & 34.
Kish: MAD 5, No. 9 rev. ii line 17 (silver distributions are also mentioned in this text.)
Asmar: MAD 1, No. 3 vi line x+1 & No. 163 x line 26.

178. FSS IX No. 66

179. MAD 4, No. 47 - assigned to Umma.

180. e.g. OSP I No. 53

181. MAD 1 No. 229, rev. 14 & 15.

182. MAD 5, No. 85, tablet from Umm-el-Jir.

183. MAD 1, no. 7

184. ibid., ii:x+1 Mamasarat, also in No. 163, i 34; No. 53 r x+i 4. Note that oil may be used for industrial uses such as weaving and ointments as well as for eating and cooking, and lighting.

185. It is possible that the women with a son may have 6 SÌLA each and one for the son. see ibid., 6 FPN 11) u 1 DUMU-sa.

186. Lambert RA 59, 122, No. 36

187. Westenholz Jena No. 40, dated to before Narim-Sin, month GUR_x.KU_5.

188. ibid., No. 168, this is written as an account with a number of ENGAR followed by 1 KAŠ, 1 ŠAḪ.TA and the name of another man (presumably the foreman). The 25 ZÍZ.A.KU.DU_8 comes iv, 4, before the totals. No date is given.

189. ibid., No. 119.

190. see Appendix I.

191. see Gelb I.J. ' The Philadelphia Onion Archive' Studies Landsberger, 40.

192. see Chapter 3
Lambert RA 59 No. 35.

193. eg. TCS I Nos. 17, 51, 141, 27, 99, 101 & 151;
Pinches Amherst Nos. 43 & 47.

194. Pinches Amherst No. 90.

195. Eames Coll. F12.

196. TCS I No. 107.

197. UET III, No. 1041 lines 1 & 3, No. 1045.

198. ibid., No. 1025 lines 18 - 25.

199. ibid., No. 1066 totals.

200. ibid., No. 1078.

201. ibid., No. 1040, children and old women appear only to receive oil. Totals: rev. v 1-16.

202. ibid., No. 1047. The total mentions fish also - rev.ii, 6.

203. ibid., No. 1048, totals lines 27-36.

204. ibid., No. 1125.

205. e.g. ibid., Nos. 1090, 1092, 1095. Note that in No. 1095 only 2 SÌLA per person were issued so that dates were not the only monthly rations for these workers. Presumably they were in addition to other items.

206. UET III No. 1431, totals 14-21.

207. UET III No. 1046, see also No. 982 where a man has 10 SILA barley counted for oil.

208. Gelb I.J. JNES 24, 1965, 233-235.

209. e.g. UET III No. 1047 rev.ii 13: 19 men have 25 SILA barley, 10 SILA dates and 3 SILA oil; No. 1125, line 1: 2 men have 20 SILA bread and 5 SILA oil.

210. Ibbi-Sin Year 8, month 6: UET III No. 1025; Yr 9 month 4: No. 1066; Yr 9, month 5: Nos. 1047 & 1125; Yr. 9, month 9 No. 1041; Yr. 9 month 11: No. 1158; Yr. 9 month 12: Nos. 1420, 1144 & 1048.

211. SACT II, 313-315, No. 292 especially lines 24-26.

212. UET III No. 1419, lines 1 - 3.

213. SET, 280.

214. e.g. Pinches Amherst Nos. 70, 71, 72 & 74.

215. Details are taken from the following sources: SET Nos. 202-232; Pinches Amherst Nos. 61, 70-72, 74 & 77; Eames Coll. Nos. A3, B5, D13, G12.

216. Onions are sometimes issued by bunch (SA) - see e.g. SET No. 214.

217. These figures are calculated from the Old Babylonian texts from Chagar Bazar, AOAT I Nos. 36, 43 & 46. See also Chapter 3

218. Davidson, Passmore & Brock, 539-540.

219. Landsberger Jahreszeiten, 252a.

220. SET Nos. 213-220, 222-232.

221. ibid., Nos. 208, 210-212.

222. UET III No. 89, Ibbi-Sin Year 1, month 9; No. 88 Ibbi-Sin Yr.1 Month 12 (see also No. 1229)

223. ibid., No. 1303, Ibbi-Sin Yr.8 month 9.

224. e.g. SACT I No. 138 (Šulgi 44) and No. 163 (Amar-Sin 8) and No. 175 (Šu-Sin 7). The animals include sheep, goat and oxen.

225. TCS I No. 325 (Lagaš)

226. Gelb I.J. 'Prisoners of War in Early Mesopotamia' JNES 32, 1973, 83.

227. See Appendix I.

228. UET III, No. 1039, line 10. The Calorie intake of dates is taken from Pellett P.L. & Shadaravien S. Food composition.. Section 1, No. 42.

229. UET V No. 502, Rim-Sin, Year 11, month 3.

230. ibid., No. 500, lines 1-5, Silli-Adad Yr 1, month 10.

231. ibid., No. 501.

232. ibid., No. 505.

233. ibid., No. 504: ZÌ.ŠE: Line 2, ZÚ.LUM line 3, Ì line 4, KAŠ line 5, Ì.NUN line 29.

234. ibid., No. 509, note however that the sign may be KAŠ, line 1.

235. ibid., Nos. 511 & 616.

236. Walters S.D. Water for Larsa: an Old Babylonian Archive dealing with irrigation, 112 No. 82.

237. SLB I/2, No. 41 (Larsa)

238. ibid., No. 42.

239. ibid., No. 47.

240. ibid., No. 34.

241. The site of Lagaba has not yet been found but the evidence suggests it was in the region of Babylon and Kutha. SLB I/3, 1-3.

242. SLB I/3, Nos. 77, 79, & 86. (Lagaba)

243. ibid., No. 78, line 24.

244. ibid., No. 115, lines 1-5.

245. e.g. ibid., No. 82 lines 6 & 14'.

246. ibid., No. 88, line 23.

247. ibid., No. 90, line 18.

248. ibid., 165.

249. ibid., No. 167, line 1.

250. AASOR 31, 33-36, 40-49: See Laws Nos. 3, 4, 7, 8, 9, 10 & 11.

251. AASOR 31, 41 ff. LE 11 : Law 9 includes the provisos that the man will be fired if he does not do the work and that his wages of barley will be stopped as (or when?) he is discharged and the barley, oil and wool will revert to the household. The last phrase suggests that the 15 SILA daily wages may have been split up as barley, wool and oil or that the wool and oil were additional payments - unless the 1 shekel silver given to the hired man as hiring fee was used to cover this. It would seem that the hired man received both a hiring fee and his daily rations while he was working, in both Laws 9 & 11. In Law 9 the man will be fined 10 shekels of silver if he does not do his work.

252. Simmons S.D. 'Early Old Babylonian Tablets from Harmal elsewhere' JCS XIII, 1958, 107 No. 8, Archive A. Ibalpi-el II ?Yr. 10 (see JCS XIII, 75 g.)

253. Simmons S.D. JCS XIII, 1958, No. 9, Ibalpi-el II Yr. 1? (see JCS XIII, 75 h). (See also Simmons S.D. JCS XIV, 1959, 31 No. 65 for a similar rate although here there is no clause about retaining half of the barley until the end of the year.)

254. Lutz H. Legal and Economic Documents from Ashjaly , No. 58 (translation No. 7)

255. Driver G.R. & Miles J.C. The Babylonian Laws 88-89, CH 258; 92/93, CH 271, 272, 273, 274, 275.

256. Chiera E. 'Old Babylonian Contracts ' PBS 8/2, 123-124 (No. 166 Nippur CBS 7112) transliteration and translation, Plates LXVIII & LXIX,lines 8 & 9;

257. ibid., 163, transliteration and translation (No. 188 J Sherntob CBS 77) Plate CXX lines 7 & 8.

258. ibid., 131-132, transliteration and translation (No. 153 N.7026) Plate XCVII - especially 19 & 20, line 19 is very doubtful.

259. ARMT IX No. 24.

260. ARMT IX No. 25.

261. ARMT IX No. 24, field workers il -2 8; female weavers iii 40 - iv 14; young people iii 20-29.

262. Of course both the barley and bread may have been issued daily with the texts giving the monthly totals; if personal preference is the key between barley and bread this would presuppose that each person decided to have the same foodstuff every day for a month.

263. Dalley et. al Nos. 206-208 & 210.

264. AOAT I: No. 13 (ŠE.KIN.KUD), No. 21 (Maqranim) No. 30 (Abum) No. 34 (Mammitum) No. 41 (Tamhirum), No. 44 (Mammitum), No. 42 (Nabri), No. 40(Kinum), No. 7 & No. 45; Gadd C.J. Iraq VII, 1940, A.949 (Atarium) A.980 (Dumuzi)(līmu Ahiaya) A.986 (Nikim) (līmu Aššurmalik). (except for the two latter texts, all the others come from līmu Adad-bani)

265. Gadd C.J. Iraq VII, 1940, A944. Note that here 1 SÌLA ŠE is equal to I SÌLA NINDA but 1 SÌLA KAŠ.UŠ equals .6 SÌLA ŠE.

266. ibid., A. 943.

267. UET V No. 508. Ì.NUN line 4, Ì.ŠAḪ line 9, ZÚ.LUM line 11

268. Goetze A. 'Thirty Tablets...' JCS II, 1947, 49, No. 8

269. ARMT VII Nos. 200-202, & 205.

270. ibid., No. 206.

271. ARMT IX No. 243

272. ARMT XII No. 5 (14 or 24 Kiskissum, līmu Aššur-malik) No. 10 (21st Uruḫum, līmu Asqudim); No. 12 (5th Malkanum līmu Asqudim). For SI.LÀ as maintenance see Birot ARMT IX, 257, 17, 4b.

273. ARMT XII No. 6 (30th Dagan, līmu Aššur-malik) No. 11 (30th Uruḫum, līmu Asqudim)

274. ARMT XII No. 299, lines 5 & 7 (Year Zimri-Lim dedicated (?) the statue of Ḫatta).

275. ARMT IX No. 216 v lines 47-48 (Birot ARMT IX, 287, 69 3a, suggests this is an additional payment).

276. ARMT IX, 287, 69, 3d.

277. ARMT IX No. 121 iii 19-26.

278. e.g. ARMT XII No. 555, 4 (2 ugar barley); ARMT XI, 133, No. 237 (2 ugar barley), No. 295 (1 ugar 8 kur 34 qa fruit for the abarakkatim, for ḫimri.)

279. These texts are only examples taken from the named sites but they cover the main rates of rations issued.

280. ARMT IX No. 24: apprentices, lines i 47, 55, ii 43; young girls e.g. iii 22-29, iv 44-45; ARMT IX No. 25: dependant of Ewennikki: rev., 43, 45-47.

281. Dalley et al. No. 207, girl, iii 3, included in man's (?father's) ration of 60 SÌLA - see sub-total, lines 12-13.

282. Shepherd: AOAT I No. 3, 1 & No. 21, 1 (ŠE.KIN.KUD and Maqranum)
Gadd C.J. Iraq VII, 1940, A.949 (Airum), A.958 (Nabri)
Groom: Gadd C.J. Iraq VII, 1940, A.946 (Tirum); AOAT I No. 30 (Abum)
Farmer & family: AOAT I No. 34, 7-10, (Mammitum); Gadd C.J. Iraq VII, 1940, A.977 (ŠE.KIN.KUD)
(All from līmu Adad-bani)

283. B.E XIV 91a (Torczyner Tempelrechnungen No. 39); BE XIV No. 56 a (Torczyner Tempelrechnungen No. 54); BE XIV No. 60 (Torczyner Tempelrechnungen No. 40)

284. BE XIV No. 58 (Torczyner Tempelrechnungen, 66)

285. HSS XIV No. 593, 59.

286. e.g. HSS XIV No. 597, 1-5, 37-40; see also Nos. 606 & 654 for issues of bread wheat.

287. HSS XVI Nos. 421b and 423.

288. A) BE XIV No. 58 (Torczyner Tempelrechnungen No. 66) 13th year of NaziMurattash.
B) BE XIV No. 91a (Torczyner Tempelrechnungen No. 39) 3rd year of Kadašmanturgu.

289. Some of the rations (e.g. HSS XIII Nos. 128 & 214) were made in bread-wheat (GIG). The Calory value of this is lower than that of barley (see Pellett P.L. & Shadarevian S Food Composition..., Section 1 Nos. 1 & 7, barley: 360 Calories, wheat 354 Calories. All the listed nutrients are a little lower in wheat except for thiamin.

290. Helbaek H. in Mallowan Nimrud, 614.

291. Postgate Archives, 184, No. 185 lines 5-13.

292. Postgate Taxation, 399 ND 3467, lines 7-10. Line 10: ŠE kišinni: CAD Vol.8, K. kiššanu, a leguminous plant, 456.

293. ibid.,, 369 ND 453, lines 2-5. The tablet is damaged and most of the figures are restored.

294. Thureau-Dangin F. Une relation de la Huitième campagne de Sargon I, Plate III & 10, col.i line 53.

295. Parker B. 'Administrative tablets from the North West Palace, Nimrud' Iraq XXIII, 1961, 55 ND 2803.

296. ibid., 56-7, obv. col.ii lines 17'-31' and rev. col.i 11-21.

297. see Appendix I

298. Published in Wilson J.K. Nimrud Wine Lists.

299. ibid., 117 and forward xiv.

300. This amount of wine suggests that these rations were meant for about 10 men for one day but as that would mean that each man had 9 SILA flour for 1 day, this seems unlikely.

301. Nimrud pots, in the Institute of Archaeology, University of London: Nos. ND 3028, 3139, 3119, 3024, 9007, 3103, 3137, 614, 658, 639, 613, 661, 1264.

302. Gelb I.J. 'On the alleged temple and state economies in Ancient Mesopotamia' Studio in Onore di Eduardo Volterra, 6, 1969, 148-9; Ellis Agriculture, 81-85.

303. Ellis Agriculture, 57.

304. Driver G.R. & Miles J.C. The Babylonian Laws, 20-27, CH 26-41.

305. Postgate J.N. 'Land tenure in the Middle Assyrian period: a reconstruction' BSOAS XXXIV, 1971, 496-52; Ellis Agriculture, 130-132.

306. Ellis Agriculture, 146.

307. see Chapter 2

308. Schneider Dr. A. 'Die Anfänge der Kulturwirstschaft...' Staatswissenschaftliche Beitrage, IV, 110, Table IV (STH I, 40); Maekawa K. Mesopotamia 1973/74, VIII/IX, 88 note 19 (STH I, 7)

309. See Chapter 2

310. USDA, FAS - M 108. No. 4 Table 4.

311. Diyala Report, 41 Appendix XIX

312. ibid., see CT 33, No. 43 (Sippar)

313. Appendix 2.

314. A. J.Fac. Med. (Baghdad), Vol. 14, 1950, 88-123.
B: Demarchi M et al. 'Family food consumption survey of workers belonging to the brick industry' J.Fac.Med. (Baghdad) (NS) Vol. 5, 1963, 173-178.

315. B: Table IV

316. A: 118-121.

317. Patwardhan V.N. and Darby W.J. Nutrition in the Arab Near East, 273.

318. Pellett P.L. & Jamalian J. 'Observations on the protein-calorie value of Middle Eastern foods and diets' in Man, Food and Agriculture in the Middle East (T.E.Stickley et al. eds), 635, Table 5.

319. SET Nos. 218-220, 230-232; Pinches Amherst Nos. 61, 70-71; Eames Coll. Nos. A3, D13; SACT II Nos. 302, 303 etc.

320. ARMT XIX, Nos. 351, 352, 356.

321. UET VIII Plate XV, no. 72 lines 50-55, p.15. Sollberger gives line 55 as UZU.NI.KU.E SUB.BA but cannot readily explain it.

322. ibid., 15. Bread issues alone equal 4185 Calories plus barley, beer and oil.

323. USDA FAS-M 108 No. 4 Table 4; J.Fac.Med. (Baghdad) 14, 1950 98 Table 2; J.Fac.Med. (Baghdad) 5, 177 Table 2; Or.34/35 43 VAT 4416; Westenholz Jena Nos. 29 & 34 (only restored figures used); TCS I Nos. 17 & 335; SACT II No. 21; ARMT IX No. 25; SLB I/3 No. 86; BE XIV No. 58; HSS XIII Nos. 19 & 113; HSS XIV No. 593.

324. The texts for the averages were selected in order to include as wide a cross section of ration rates as possible and to avoid as much as possible any weighting in favour of any one rate of ration.

325. A: J.Fac.Med, (Baghdad) 14, 93.

326. Davidson, Passmore & Brock, 213.

327. ibid., 236.

328. Clark C & Haswell M. The Economics of Subsistence Agriculture, 21.

329. Compare Figure 1 and J.Fac. Med (Baghdad) Vol. 5, 175 and 177 Table 2.

330. FAO Nutritional Studies No. 28, 43; Davidson, Passmore & Brock, 143-144.

331. J.Fac.Med. (Baghdad), 14, 102-103 ; Davidson, Passmore & Brock, 97.

332. Sources: Davidson, Passmore & Brock, 92-102, 125-128, 267-272; FAO Nutritional Studies No. 28, 28-32, 49-52.

333. e.g. Parrot Sumer No. 152; Moorgat Art Nos. 95, 97, 98.

334. e.g. Gadd Stones No. 36.

335. Driver G.R. & Miles J.C. The Assyrian Laws, 127 and Nos. 4, 6, 8 (Tablet A, para.40)

336. Carbonell V.N. (M.A.Thesis) Dentition of Kish Population 3000, BC., 71

337. Dudley Buxton, L.H. 'Appendix on the Human Remains excavated at Kish' in Excavations at Kish I (Langdon S.) 125 (only 8 crania were examined here)

338. Swindler D.H. Study of the Cranial & Skeletal material excavated at Nippur, 11-12.

339. Keith Sir A. ' Report on the Human Remains' UE I, 214-220.

340. None of the studies were carried out with a view to discovering nutritional diseases. Such a study would be desirable.

341. Wilson J.K. 'Leprosy in Ancient Mesopotamia' RA 60, 1966, 53; Wilson J.K. in Diseases in Antiquity (D.Brothwell & A.T.Sandison eds.), 193.
The translation is not without challenge. Professor F. Kocher considers būšānu to have similar symptons to diptheria. (Personal communication, 18th April 1977)

342. Wilson J.K. RA 60, 53-54.

343. FAO Nutritional Studies, No. 28, 35.

344. Davidson, Passmore & Brock, 136 - these studies were on lactating Indian women who showed losses of Vitamin C in milk and urine far in excess of the dietary intake.

345. e.g. Bauer No. 44 ii 3, No. 47 i 3, No. 48 i 2, No. 51 i 3 and p.194; RA 47, 1953, 68 UK4 (DP 339); Or. 34/35, 55 No. 4 (STH I, 16); (Gelb I.J. 'Prisoners of War in Early Mesopotamia' JNES 32, 1973, 87); AOAT I, 42 iii 3 & 4, No. 45 iv 34-36.

346. e.g. Moorgat Art Nos. 27, 57, 60 & 61.

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1. Ministry of Planning Results of the Agricultural... Amara liwa Table 9.

2. Ebeling E. 'Ein rezept zum Würzen von Fleisch' Or. (NS) 18, 1949, 171-72.

3. Gordon Sumerian Proverbs, 65 line 48, 144 line 192, 63 & 458 lines 46 & 47.

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